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SOCIOECONOMIC TECHNICAL REPORT:

SUNNYSIDE SPECIAL TAR SANDS AREA DEVELOPMENT ANALYSIS

by

David W. South, John C. Nagle, James W. Nagle,
Kenneth J. Rose, and Richard C. Winter

Energy and Environmental Systems Division
Economic and Social Sciences Section

April 1984

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U.S. DEPARTMENT OF THE INTERIOR
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PREFACE

Argonne National Laboratory has conducted three assessments of the potential socioeconomic effects of tar sands development in Utah. The first report considered the regional effects of the designated tar sands developments in Utah (*Regional Socioeconomic Analysis of Tar Sands Development in Utah*, ANL/EES-TM-245). This report, the second of the three studies, evaluates the areawide and local socioeconomic impacts of developing the Sunnyside site, one of nine special tar sand areas (STSAs) designated in the hydrocarbon leasing program (Combined Hydrocarbon Leasing Act - Public Law 97-78). The third study addresses the potential socioeconomic impacts of developing another Utah STSA, the Tar Sands Triangle.

Readers who wish to examine data from the Utah Office of the State Planning Coordinator should be aware that this office, which was the source for much of our data, has changed its name to the Office of Planning and Budget, State of Utah.

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ACKNOWLEDGMENTS

The authors wish to acknowledge the contributions of the Utah State Planning Coordinator and the Utah State University Foundation. Brad Barber and Jeannie Watanabe, of the State Planning Coordinator's Office, provided the demographic and economic data (UPED model output) used in the baseline and impact analyses. Lee Nellis and John Nicholson, of the Utah State University Foundation, furnished evaluations of the infrastructure in the counties, communities, and towns situated in the tar sands areas.

The authors also wish to acknowledge the assistance of David Hillier and Duane DePaepe from the Bureau of Land Management's Richfield District Office and Robert Pizel and David Willard from the Bureau's Denver Service Center. They provided technical and management support.

Finally, the authors wish to express their appreciation for the support of Argonne staff who were instrumental in preparing this report. In particular, we would like to thank Barbara Salbego and John Cleland for their assistance in producing this report; Mary Jo Koelbl and Linda Haley for generating the computer graphics; and Jean Korn and Nu Ly Brooks for drafting.

SUMMARY

INTRODUCTION

The Combined Hydrocarbon Leasing Act of 1982 (Public Law 97-78) provides guidelines for converting federal oil and gas leases to combined hydrocarbon leases in Special Tar Sands Areas (STSAs). The STSAs are designated by the U.S. Department of the Interior as areas that contain substantial deposits of tar sands. Under a combined hydrocarbon lease, tar sands can be developed in addition to oil and gas. Before an oil and gas lease can be converted, however, the socioeconomic consequences of the combined hydrocarbon lease must be evaluated.

This report evaluates the socioeconomic consequences of developing the tar sands in the Sunnyside STSA in east-central Utah. Figure S.1 shows the STSA and the counties that surround it. Effects of tar sands development were examined on several levels: areawide, county, census county division (CCD), and community. Effects were projected over the 20-year period from 1985 to 2005 and are described for the five "window years" of 1985, 1990, 1995, 2000, and 2005.

To prepare this analysis, a four-step procedure was followed. First, the existing social and economic conditions of the area were described. Second, conditions were projected for the 20-year period under the assumption that no tar sands resources are developed. Third, the proposed tar sands developments were described. The descriptions included estimates of (1) production levels and (2) the work force required to mine the tar sands and to construct and operate the accompanying retort facilities. Descriptions were prepared for three scenarios; one assumed a proposed level of tar sands development, another assumed a partial conversion development, and a third assumed a low, or unitized, level of development. Finally, the impacts of these developments were projected for the 20-year period and then analyzed.

In addition to tar sands development, the development of other energy resources (coal mines and an off-tract tar sands project) in the same area within Utah were examined. The socioeconomic impacts of these developments were estimated and added to the projected impacts of the tar sands developments.

Two socioeconomic models were used to collect and analyze data. The Utah Process Economic and Demographic (UPED) impact model was used to project aggregate impacts under the baseline conditions, the three scenarios for tar sands development, and the two scenarios for development of other energy resources. After these impacts were projected, the Spatial Allocation Model (SAM) was used to distribute the impacts among the communities, CCDs, and counties. The types of effects examined include, for example, impacts on population; number of households; employment; wages; per capita income; and elements of the public and private infrastructure such as housing, education, health care, and utilities.

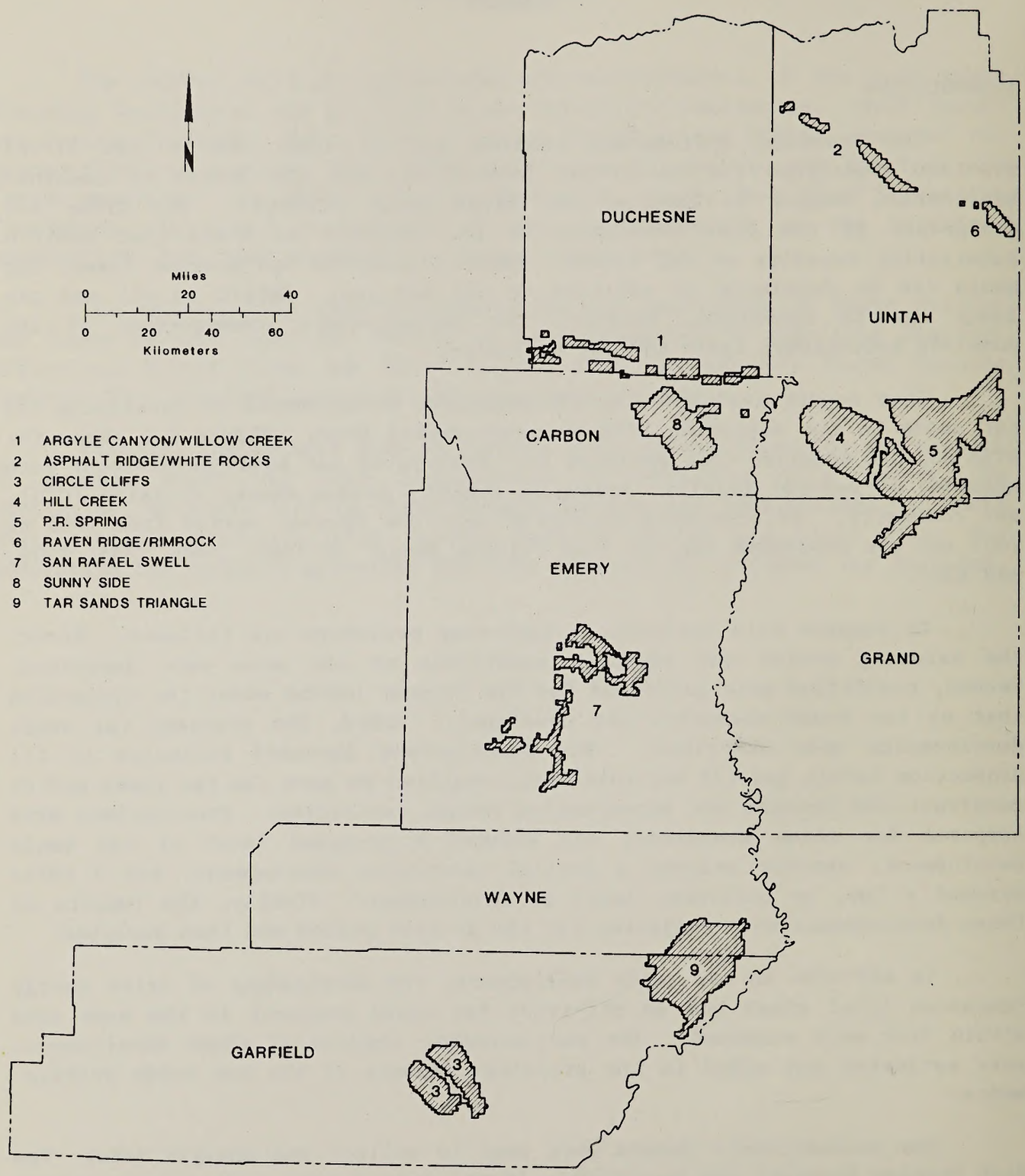

Fig. S.1 Sunnyside STSA and Surrounding Counties

DESCRIPTION OF TAR SANDS AREA

In step one of our analysis, we described the existing social and economic conditions in the area under study. The area under consideration consists of two counties in east-central Utah: Carbon and Emery. Much of the two-county area is sparsely populated. In the state as a whole there were 17.8 people per square mile in 1980, while the figure for the United States was 64. In comparison, Carbon County had 15 people per square mile and Emery County had 2.6 people per square mile. Price was the only community in the area with a population greater than 4,000 in 1980. No town had a population of more than 10,000 people.

The geography of the area has an obvious influence on the limited number of settlements. Canyons, cliffs, plateaus, and rugged terrain are common in the area. Water is often in short supply. Any development has to contend with the substantial physical barriers imposed by the area.

Traditionally, most of the two-county area has been dependent on agriculture or energy development. As of 1980, mining was the principal employer in Carbon and Emery counties. The area is well acquainted with the cyclical nature of industrial, especially energy-related, growth. The coal industry in Carbon and Emery counties has experienced frequent boom and bust periods.

In addition to the prospect of tar sands development, there are currently numerous other energy developments in the area. Coal production in Carbon and Emery counties has been stimulated by demand from local and out-of-state industries. The mines and the projected tar sands developments are located near local population centers.

Between 1970 and 1980, population grew in both counties. Moreover, the two counties grew more rapidly than the state as a whole. With a population of 22,179, Carbon County was the larger of the two counties in 1980. The county grew 42% between 1970 and 1980. The population of Emery County increased by 125% between 1970 and 1980. Growth in the counties was due chiefly to the development of coal mining.

Employment in the two counties grew more rapidly than population from 1970 to 1980, when employment approximately doubled. Within each county, employment growth varied widely by economic sector. In general, growth was faster between 1970 and 1975 than between 1975 and 1980.

Per capita income also increased in both counties from 1970 to 1980. In 1980, the higher per capita income in the two-county area was $9,105 in Carbon County.

The existing infrastructure services in 1980 were usually just sufficient to meet the needs of the population. The quality of services, however, varied substantially. For example, the capacity of water delivery and sewage systems was often inadequate for the number of people served.

PROJECTIONS OF BASELINE SOCIOECONOMIC CONDITIONS

Step two of our analysis was to project baseline socioeconomic conditions, assuming that no tar sands resources were developed, for the 1985-2005 period. Figure S.2 illustrates the projected growth in the baseline population for each county. Most significant growth occurs between 1980 and 1995. The growth in number of households follows a similar pattern.

Baseline employment projected between 1980 and 2005 also follows this pattern. The fastest rate of increase occurs between 1980 and 1985 for both counties. However, Carbon County is expected to grow almost continuously throughout the period, while Emery County is forecast to have relatively little change between 1985 and 2005. For the overall period (1980 to 2005), Carbon is expected to grow by 68% while Emery is expected to grow by 26%.

The baseline per capita personal income (PCPI) for the state is assumed to grow at an annual rate of 1.7%; by the year 2000, the state per capita income would be $11,568. Between 1985 and 2005, it is projected that Carbon would experience a 23.6% increase in per capita personal income. The PCPI for Emery County would increase by 40.9% over this period. The 40.9% increase in Emery is a result of the assumed annual growth rate (1.7%). However, the growth rate of Carbon County is assumed to be 1.07% annually because Carbon

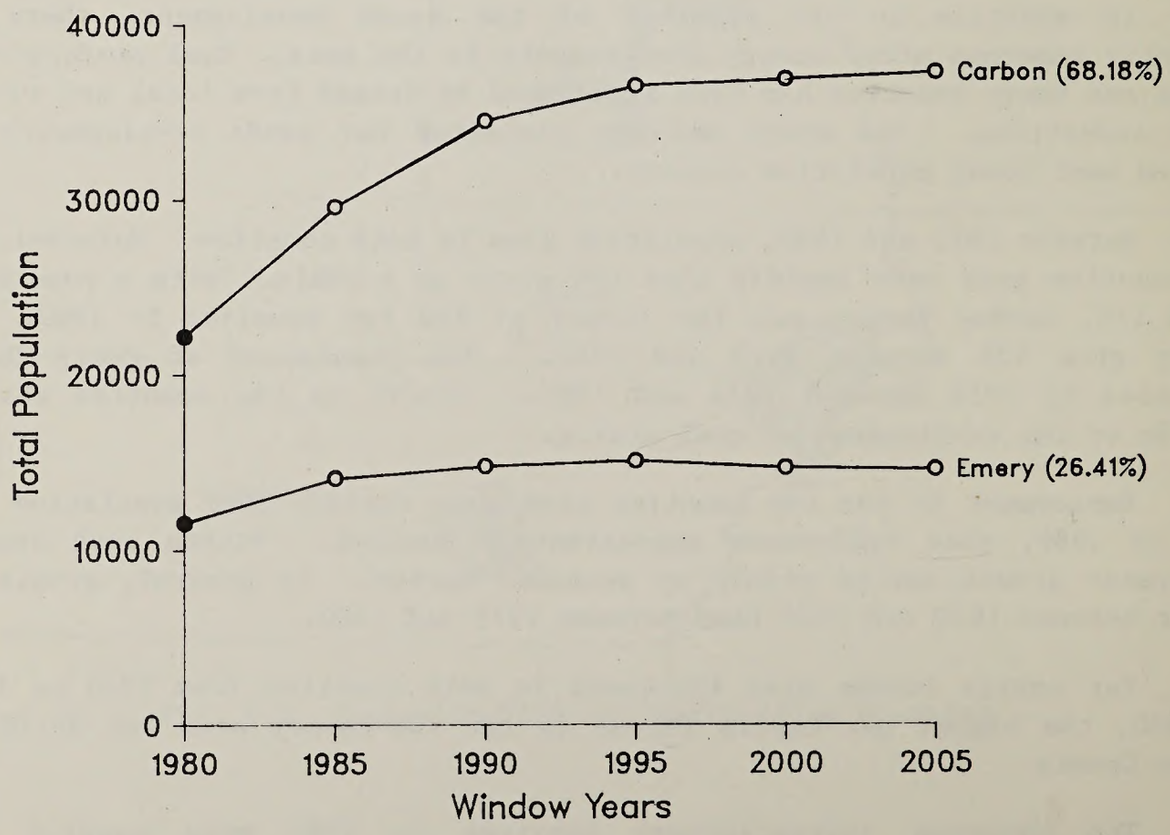

Fig. S.2 Baseline Population Projections by County, 1980-2005 (1980-2005 percent change in parentheses)

had achieved a higher average per capita income level relative to the state in the last half of the 1970s. It is then assumed that this phenomenon would be reversed during the next two decades and that by the year 2000, per capita personal income in Carbon County would equal that of the state.

Both counties would experience a substantial increase in total personal income. In 2005, total personal income in Carbon County would be 55.8% greater than in 1985; in Emery this figure would be 45.9%. Carbon County would still have the greatest total personal income: $469 million. In 2005, total personal income would be more than $285 million greater in Carbon County than in Emery County, a 61% difference, due entirely to the difference in population.

Baseline projections of infrastructure services were based on minimum state standards for provision of such services and the projected population. Consequently the growth of infrastructure services follows the same general pattern as population growth.

TAR SANDS DEVELOPMENT SCENARIOS

In step three, we developed three commercialization scenarios that correspond to the potential tar sands development alternatives. In the proposed action development scenario, total production of oil from tar sands is projected to be 115,000 barrels per day (bbl/d). Under the partial conversion development scenario 80,000 bbl/d would be produced; the unitized development scenario, which consists of a single surface mining project, is projected to have a total production of 50,000 bbl/d. Each scenario is based on company-specific project plans and expected future developments. Only the effects of development in the Sunnyside STSA are directly considered in this report between the years 1985 and 2005.

Under the proposed action development scenario there are assumed to be four surface and one in-situ tar sands developments. Although total production from these tar sands developments is projected to be 115,000 bbl/d, production is expected to vary significantly by project.

The largest project under this scenario is the Amoco project with a total daily production of 50,000 bbl. The Mono project is the next largest with a production level of 30,000 bbl/day. EnerCor is estimated to be third largest at 20,000 bbl/day, followed by the Chevron project at 10,000 bbl/day and the smallest project (the only in-situ project considered in this scenario) Sabine at 5,000 bbl/day.

The total manpower requirements of the proposed action scenario are depicted in Fig. S.3. Since the construction and operation manpower requirements vary considerably from project to project, the total manpower requirement as a result has several peaks. The first peak is in 1989 when the total requirement is 5,125 workers. This first peak is due mostly to the Mono

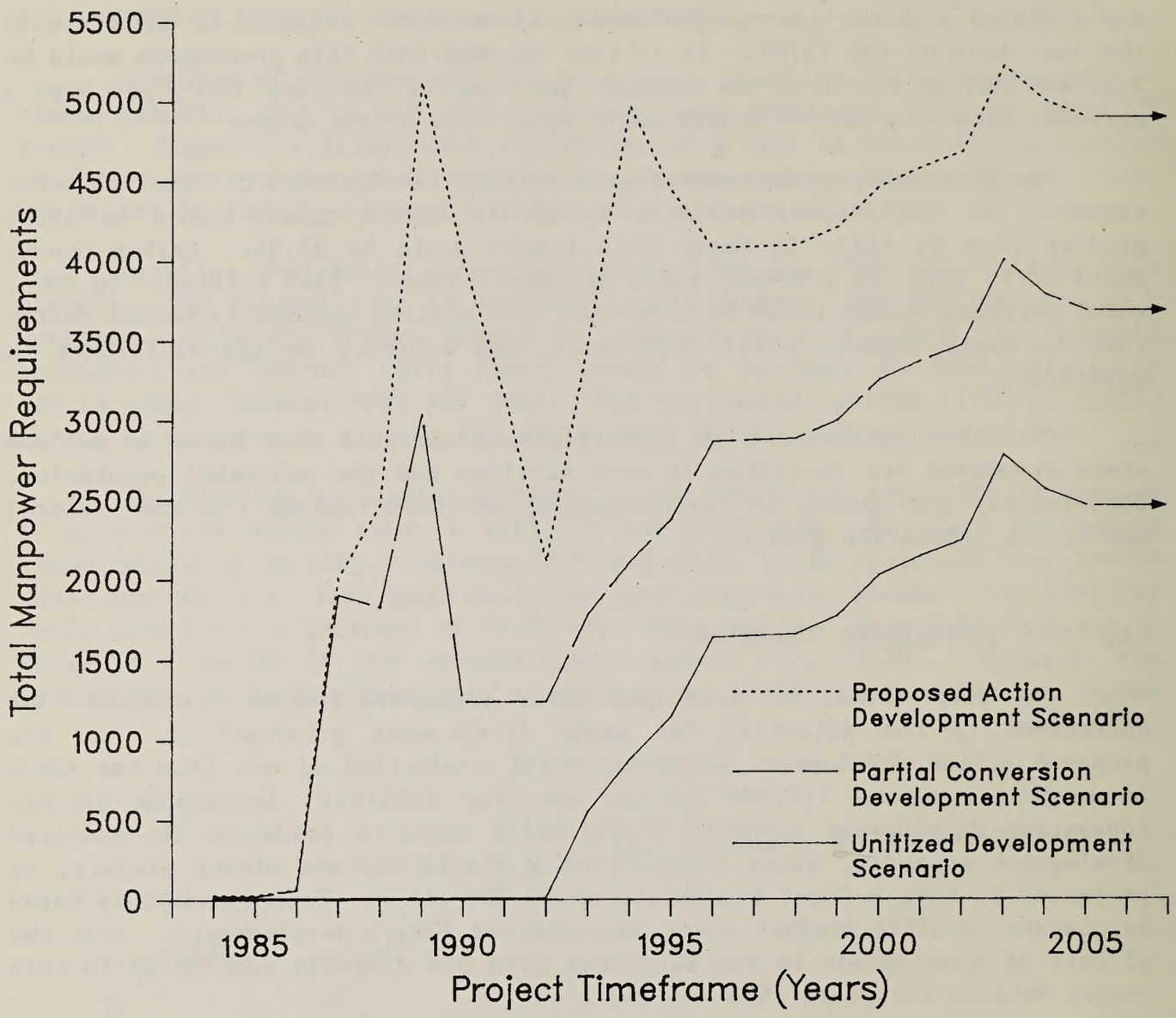

Fig. S.3 Sunnyside STSA Manpower Profiles by Development Scenario

project, which reaches its operation requirement peak of 1,230 workers and is also just below its construction peak at 1,800 workers (the last year construction workers are required). The EnerCor project is also near its construction peak in 1989 at 2,000 workers. The second peak in 1994 (lower than the first) is due mostly to the Chevron project, reaching its peak construction requirement of 2,000 workers while three other projects, Mono, EnerCor, and Sabine, reach their peak operation requirements (and remaining stable until 2005) at 1,230, 800, and 35, respectively. The final peak occurs in the year 2003 at 5,230, the highest level reached for the proposed action development scenario for the study period. This peak is principally attributable to the attainment of the operation level for each project; this level corresponds to the peak for each project's operation requirements.

The partial conversion scenario consists of two projects, one surface and one in-situ production facility. The total production level is estimated to be 80,000 bbl/day, with most of that production (75,000 bbl/day) coming from the surface project. The remainder, 5,000 bbl/day, is expected from the in-situ project.

The total manpower requirements are expected to peak first at 3,040 workers in 1989, the year the surface project reaches its peak construction level (1,810 workers) and also requires 1,195 workers for operation. The last peak under this scenario occurs in 2003, when both projects are at their peak operating requirements and some construction requirements are still needed for the surface project. Operation requirements in 2003 are expected to reach 3,660 for the surface project and 35 for the in-situ project.

The unitized development scenario is composed of one surface project only, with an expected production level of 50,000 bbl/day. Construction for this project begins in 1985 and reaches a peak of 475 workers in 1994. Operation employment begins in 1993 and rises to a peak level of 2,465 in 2003, continuing at that level until the end of the study period. The peak total manpower requirement for the unitized development scenario also occurs in 2003 at 2,785.

TOTAL AREAWIDE IMPACT BY DEVELOPMENT SCENARIO

Two important assumptions underlie these impact projections. The first assumption is that the baseline projections accurately reflect the socio-economic composition of the counties in the periods under study. The second assumption is that the manpower requirements of each scenario would not change. Given these assumptions, the analysis is based on the difference between the baseline projections and the projections of each tar sands development scenario. Thus all results are given as changes from the baseline projections rather than as total impacts.

Projected Impacts of the Proposed Action Development Scenario

Under the proposed action scenario, most areawide impacts follow a pattern of rapid growth until 1990. After 1990 growth continues throughout the period but at a much slower pace. For example, population of the two-county area would grow from 85 above the baseline in 1985 to 16,575 above the baseline in 1995 and then grow less rapidly to 23,612 above the baseline in 2005. This growth corresponds to 278 times the baseline population level projected for 1985.

School-age population in the two-county area would grow from 16 above baseline in 1985 to 7,128 above the baseline in 2005 (a growth factor of 446), while retirement-age population would increase from being negligible relative to the baseline in 1985 to 794 above the baseline in 2005. The change in the

number of households would grow 67.21% annually from 1985 to 1995 but then grow by only 2.31% annually from 1995 to 2005.

The change in the school-age population would create a demand for two more teachers and classrooms than the baseline in 1985, rising to 285 more teachers and classrooms than the baseline in 2005.

Total areawide employment is also projected to grow rapidly over the baseline during the 1985-2005 period. In particular, employment would expand from 41 additional workers in 1985 to 9,709 in 2005. This 2005 employment level is 237 times that projected to be required in 1985. Again, this increase would be most dramatic from 1985 to 1995.

The increase in infrastructure demands varies. All of the additional infrastructure service demands would be created by the population growth projected under the proposed action development scenario. Two more general care hospital beds than the baseline demand are projected to be needed in 1985, rising to 33 beds in 1995 and then rising more slowly to 47 beds in 2005. The change in long-term care hospital beds will grow from zero in 1985 to a high of 32 in 2005. In 1985, two more doctors, dentists, nurses, public health nurses, clinical psychologists, and mental health workers would be needed in addition to the baseline projections. By 2005, the changes in the demand for medical personnel would increase to 14 doctors, 12 dentists, 41 nurses, 5 public health nurses, 2 clinical psychologists, and 3 mental health workers.

Similar increases are projected for public safety services such as jail space, police officers and patrol cars, emergency medical technicians, and juvenile holding cells. In each case, the demand for these services would peak in 2005. The change in the utility service demands is projected to increase from 55% to 69% annually from 1985 to 1995 and then increase by 3.6% annually from 1995 to 2005.

The change in total monthly personal income in the area would grow from $0.1 million in 1985 to $19.9 million in 1995. Between 1995 and 2005 the change will rise to $28.4 million. In 2005, wages would account for about 78% of the change in total monthly personal income; property income and other labor income would account for the other 22%.

Projected Impacts of the Partial Conversion Development Scenario

Similar to the proposed action scenario, most impacts projected under the partial conversion scenario follow a pattern of rapid growth from 1985 to 1995 and slower growth from 1995 to 2005. Under the partial conversion development scenario, the change in the population of the two-county area would grow continually, from 69 in 1985 to 17,847 in 2005. Most of this growth would take place between 1985 and 1995 when the population would increase at an annual rate of 63.46%. School-age population would increase at a somewhat higher rate.

Total areawide employment is also projected to grow rapidly over the baseline -- from 34 additional workers in 1985 to 7,363 in 2005. This 2005 employment level is 217 times that projected to be required in 1985. Again, this increase would be most dramatic from 1985 to 1995. In this period, total employment would rise 62.05% annually; in the following 10 years there would be much slower growth at 5.66% annually.

The number of households would grow from 25 above baseline in 1985 to 3,025 above baseline in 1995. It would then grow to 5,053 above baseline in 2005.

As in the proposed action scenario, the change in infrastructure demands varies by service category. Two more classrooms and teachers in 1985 and 209 more classrooms and teachers in 2005 would be needed to accommodate the change in the number of students from the baseline projections between 1985 and 2005. The change in the number of students would be 400 times greater in 2005 than in 1985, with most of this growth taking place from 1985 to 1995.

Over the 20-year period, demands for the various health care services would grow by factors of 1.0 to 18.5 above the baseline. Public safety services would grow by similar factors, except for jail space. The 8,924 square feet needed for jail space in 2005 would be 255 times greater than the amount of jail space in 1985. The change in water system service demands would grow by a factor of 240 between 1985 and 2005.

The total monthly personal income in the area, as a result of the partial conversion scenario development, would grow from $85,835 in 1985 to $21,776,078 in 2005. Most of this increase would occur from 1985 to 1995, with a 62.45% annual increase. The average monthly per capita income would fluctuate throughout the 20-year period, eventually declining $24 between 1985 and 2005.

Projected Impacts of the Unitized Development Scenario

Similar to the other two tar sands development scenarios, the impacts on the various socioeconomic categories from the unitized development scenario is generally larger in the first 10 years of the study than in the last 10 years. For total population, a growth of 31 people above the baseline in 1985 is projected, which would increase to 12,138 above the baseline in 2005. Most of this growth would occur in the 1985-1995 period when the annual growth rate would be 63.17%, followed by a growth rate of 11.33% annually from 1995 to 2005. Again, school-age population would grow at a slightly greater annual rate than total population. The retirement-age population would not grow significantly until the 1995 to 2000 period.

Employment would grow continuously over the entire period, from 15 in 1985 to 4,935 workers in 2005. This corresponds to a growth factor of 329 for

the study period. Again, most of this growth would occur in the 1985 to 1995 period when a 62.90% annual rate is projected; for the 1995 to 2005 period the annual rate of growth would drop to 9.60%.

Households would grow from 11 in 1985 to 3,338 in 2005. This results in a growth factor of 303; the annual percentage growth rates for 1985-1995 and 1995-2005 are similar to those computed for total population and employment.

The number of students (or school-age population) would have the largest growth rate of the unitized development scenario. In 1985 there are estimated to be five additional students, and in 2005 there are estimated to be 3,432 additional students for a growth factor of 686. The annual growth rate is 69.86% for 1985 to 1995 and 13.12% for 1995 to 2005. The number of teachers and classrooms would grow from 1 in 1985 to 138 in 2005.

For health care, the growth factors would range from 1 for clinical psychologists to 13 for general-care hospital beds. Public safety would have similar growth factors except for jail space, where the growth factor is expected to be 379 for the study period. The utility service growth factors would range from 222 for sewage systems to 356 for water connections during the 20-year study period.

Total monthly personal income would rise steadily during the study period, growing from $35,877 in 1985 to $14,416,892 in 2005. The annual growth rate would follow a pattern similar to that of the other categories, where growth is fastest during the 1985 to 1995 period (64.58% for 1985-1995 vs. 10.67% for 1995 to 2005). The average monthly per capita income would fluctuate between window years; over the study period the estimate in 2005 would be $24 higher than the 1985 estimate.

Projected Impacts of the Other Energy Project Scenarios

To account for the total impacts that would be imposed on this two-county area, the socioeconomic impacts that could arise from numerous Sunnyside STSA energy projects other than those related to tar sands are considered. We analyzed only those other energy projects that are located in Carbon and Emery counties.

We assumed that the development of the other energy projects would have no effect on counties other than Carbon and Emery. The reason for this is that, as stated earlier, the terrain of the area is very rugged; in particular, access to Carbon and Emery counties from nearby Duchesne, Uintah, and Grand counties is very difficult. Therefore it was assumed that (1) these surrounding counties would not be affected by the development of the other energy projects sited in the Sunnyside STSA area and (2) energy projects located in these contiguous counties would not affect the socioeconomic impacts projected for Carbon and Emery counties.

There are 20 coal mines proposed for development or expansion in Carbon and Emery counties. Total production is anticipated to reach 42.4 x 10^6 ton/yr if all mines are developed according to current plans; 20.8 x 10^6 ton/yr are designated as "new" coal production. It is this new production that is analyzed for its impact on the area. Also considered in this other projects scenario is the Chevron/Great National Tar Sands project, the only off-tract tar sands project considered in the report.

The analysis of the impacts from the other energy developments is divided into two scenarios: the maximum development scenario and the limited development scenario. The maximum development scenario is defined as production of the coal mines above the baseline level (or new coal production) plus the Chevron off-tract tar sands facility. The limited development scenario is just the new coal production considered in the maximum scenario without the Chevron off-tract facility. Unless otherwise noted, this summary analysis considers only the impact of the other energy projects under the maximum scenario.

Overall, the areawide socioeconomic impacts under the other energy projects scenario (maximum development scenario) are greater at the beginning of the study period than those for any of the three tar sands scenarios, and still greater by 2005 than the partial and unitized scenarios. The most striking difference is in the amount of growth that occurs from 1980 to 1985. In 1985, the projected change in population is 6,259 in the other energy scenario compared to 85, 69, and 31 in the proposed, partial, and unitized tar sands scenarios, respectively. In 2005, the change in population is 21,259 in the other energy projects scenario, compared to 23,612, 17,847, and 12,138 in the proposed action, partial conversion, and unitized tar sands scenarios, respectively. The rate of growth, however, is slower for the other energy project impacts than for impacts under any of the three tar sands scenarios. The limited scenario for developing other energy projects is expected to be similar to the maximum scenario -- with a population growth from 4,473 in 1985 to 19,159 in 2005.

Under the other energy projects scenario, the change in the areawide population is projected to grow by 240% over the period studied, or more than 3.4 times greater than the population projected to be above the baseline in 1985. Two age groups are projected to increase at a faster rate than the total population. The retirement-age population is expected to expand by the greatest percentage, rising from 117 in 1985 to 794 in 2005, for a 579% increase. The school-age population is also forecast to rise from 1,192 in 1985 to 6,436 in 2005, for a 440% increase. The greatest growth in each population category would occur in the period from 1985 to 1995. Total population would rise 12.19% annually from 1985 to 1995, but only 0.72% annually from 1995 to 2005. The annual growth rates for school-age population in those two years are 15.90% and 2.13%, respectively, while annual growth rates for the retirement-age population in the same years are 21.09% and 0.01%, respectively.

Total areawide employment is also projected to grow rapidly over the 1985-2005 period. Employment would more than double in the period, growing from 3,309 additional workers in 1985 to 8,942 in 2005. Again, this increase would be most dramatic from 1985 to 1995. In this period, total employment would rise 9.68% annually; in the following 10 years the annual rate of growth would be only 0.71%.

New households are projected to grow by 182% during the period studied. In the year 2005, there would be 6,185 additional households, compared to 2,191 in 1985. This growth would translate into an annual increase of 10.43% from 1985 to 1995, and 0.45% from 1995 to 2005. Once again, the 1985-1995 period is expected to experience the faster rate of growth.

Demands on the education system are projected to increase more than fivefold over the entire study period. A 440% overall increase in the number of students would translate into a 15.90% annual rate for the 1985 to 1995 period and a 2.13% annual rate from 1995 to 2005. Students, classrooms, and teachers all would increase at the same rate because the community standards for classrooms and teachers are based on the number of students.

Health care, public safety, and utility services are also expected to realize a large growth in demand from 1985 to 2005, increasing by from two to four times their 1985 levels in most categories.

Total monthly personal income would increase by 10.99% from 1985 to 1995, and by 2.36% from 1995 to 2005. In 1985, total monthly personal income in the two-county area is projected to be greater than $7 million above the baseline; this would increase to $26.2 million above the baseline by 2005.

Average monthly per capita income would decrease by 1.08% annually from 1985 to 1995. The decrease would be due mainly to the large projected decrease in employment within the construction sector; it is the only sector projected to experience a decline in employment during this 10-year period. Per capita income in the area would rise by 1.62% annually from 1995 to 2005; all sectors are projected to experience an increase in wage payments and employment in this time frame.

CUMULATIVE IMPACTS

Cumulative impacts indicate the effects produced by each tar sands scenario together with those attributable to the other energy projects. The result is the simultaneous population and employment growth that would arise due to the combined effects of all energy developments in the region.

Figure S.4 depicts total population growth projected to occur under the three cumulative scenarios plus the baseline, the two other energy project scenarios, and the baseline only. The three cumulative scenarios are: the high cumulative scenario, which is the proposed action development plus the

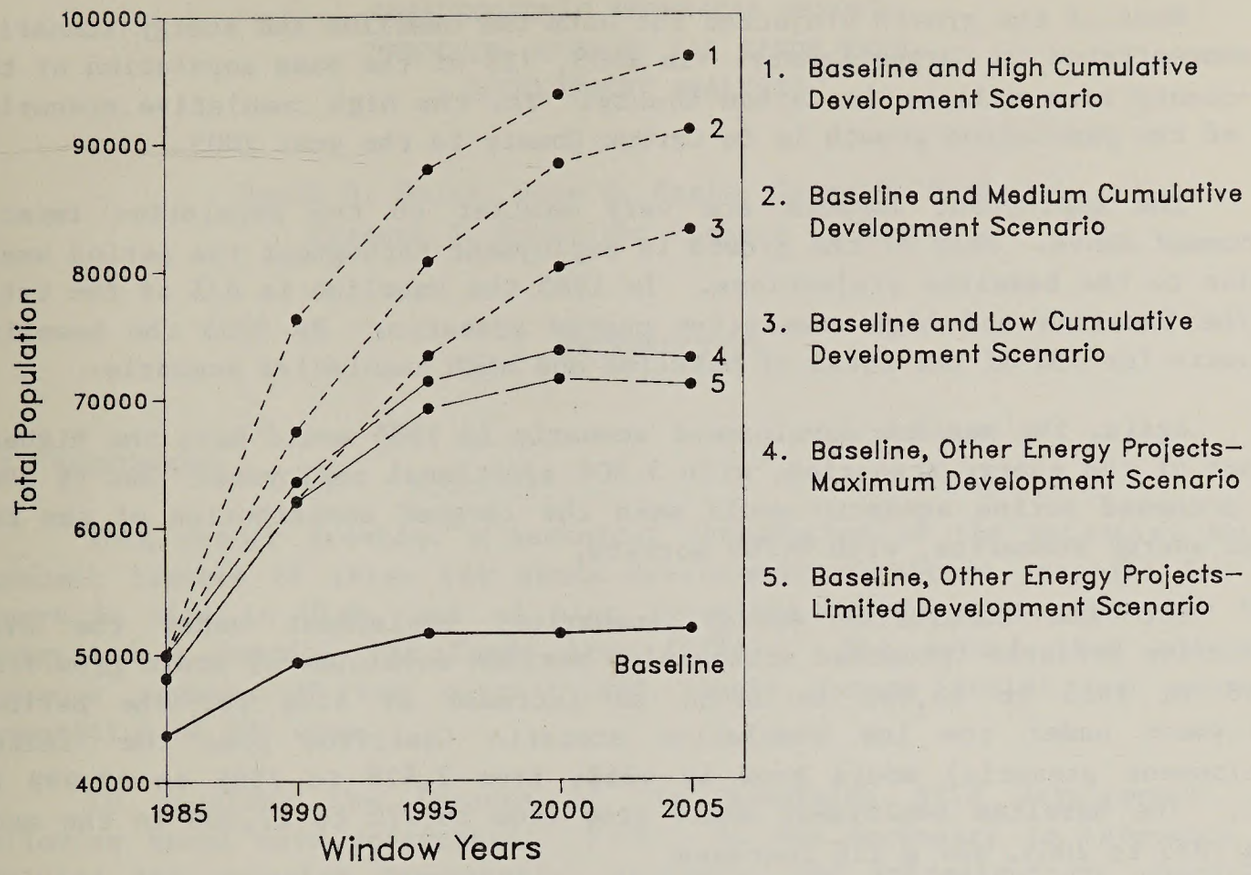

Fig. S.4 Total Areawide Population by Growth Stimuli

maximum development scenario; the medium cumulative scenario, which is the partial conversion scenario plus the maximum scenario; and the low cumulative scenario, which is the unitized development plus the limited development scenario.

All through the study period the baseline projections are much larger than any of the energy development scenarios. In 1985 the baseline projection is 87% of the total of the baseline and the high cumulative energy scenario (proposed action tar sands scenario plus the maximum development scenario for the other energy projects). By 2005 the baseline population is 54% of the total baseline and the high cumulative energy scenario. In 1985 the energy scenario (tar sands or other energy developments) expected to have the largest impact on population is the maximum development scenario (6,259 additional people); however, by 2005 the proposed action tar sands scenario would have the greatest impact (23,612 additional people).

Over the 20-year time period studied, the high cumulative energy scenario population would grow by 607%, from 6,344 to 44,871. The low cumulative scenario would grow from 4,502 in 1985 to 31,298 by 2005, a growth of 595%. In contrast, the baseline projection over the same 20-year period would grow by only 19% (from 43,650 in 1985 to 51,830 in 2005). As before, most of the growth would occur during the 1985 to 1990 period.

Most of the growth projected for both the baseline and energy scenarios is concentrated in Carbon County. In 2005, 72% of the base population of the two-county area will be in Carbon County. For the high cumulative scenario, 93% of the population growth is in Carbon County in the year 2005.

The employment impacts are very similar to the population impacts discussed above. Most of the growth in employment throughout the period would be due to the baseline projections. In 1985 the baseline is 85% of the total of the baseline and high cumulative energy scenario. By 2005 the baseline accounts for 55% of the total of baseline and high cumulative scenario.

Again, the maximum development scenario in 1985 would have the highest impact of the energy scenarios, with 3,309 additional employees. But by 2005 the proposed action scenario would make the largest contribution of the tar sands energy scenarios, with 9,709 workers.

For the cumulative energy scenarios, employment under the high cumulative scenario (proposed action plus maximum development) would grow from 3,350 in 1985 to 18,651 in 2005, an increase of 457% for the period. Employment under the low cumulative scenario (unitized plus the limited development scenario) would grow by 435%, from 2,429 in 1985 to 12,999 by 2005. The baseline employment would grow from 18,970 to 22,900 in the area from 1985 to 2005, for a 21% increase.

Similar to the pattern with population, the growth of the two-county area would be mostly concentrated in Carbon County. Seventy percent of the projected baseline employment would be in Carbon County (16,020 for Carbon vs. 6,880 for Emery) in the year 2005. For the high cumulative energy scenario 94% of the employment growth would be in Carbon County by 2005 (17,446 for Carbon vs. 1,205 for Emery).

SOCIOECONOMIC TECHNICAL REPORT: SUNNYSIDE SPECIAL TAR SANDS AREA DEVELOPMENT ANALYSIS

by

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1 INTRODUCTION

1.1 BACKGROUND

This report provides a technical description of the potential socioeconomic impacts of three tar sands development scenarios proposed for the Sunnyside site in Utah, one of nine locations in the state that has been designated a Special Tar Sands Area (STSA). The report thus addresses numerous aspects of the current and likely future social and economic composition of the area.

To consider the impacts of the Sunnyside STSA development, the following steps were undertaken. First, it was necessary to inventory and evaluate the existing demographic, economic, and infrastructure characteristics. Once a knowledge of local conditions was obtained, it was possible to project future baseline conditions in the absence of any tar sands development. Then, impacts were projected for three different tar sands development scenarios proposed for the Sunnyside STSA and for a fourth scenario for other energy projects in east-central Utah, where the Sunnyside area is situated. The tar sands impacts were then compared to one another and to the baseline conditions. The cumulative socioeconomic impacts of the tar sands developments and other energy projects were also evaluated.

The impetus for this report was provided by the Combined Hydrocarbon Leasing Act of 1982 (Public Law 97-78). This act provides for the conversion of existing federal oil and gas leases in a Special Tar Sand Area (STSA) to combined hydrocarbon leases. An STSA is an area designated by the U.S. Department of the Interior as containing substantial deposits of tar sand. A combined hydrocarbon lease permits the development of tar sands in addition to oil and gas. However, before an oil or gas lease can be converted to a combined hydrocarbon lease, an evaluation of the socioeconomic consequences of such a lease is required.

Nine potential STSA developments have been identified in Utah. These developments are located in east-central Utah, an area whose general boundaries are shown in Fig. 1.1. The nine sites, further illustrated in Fig. 1.2, are situated in seven Utah counties: Carbon, Duchesne, Emery, Garfield, Grand, Uintah, and Wayne. In an earlier socioeconomic analysis of developing the tar sands in this area (ANL/EES-TM-245), we addressed the regional impacts

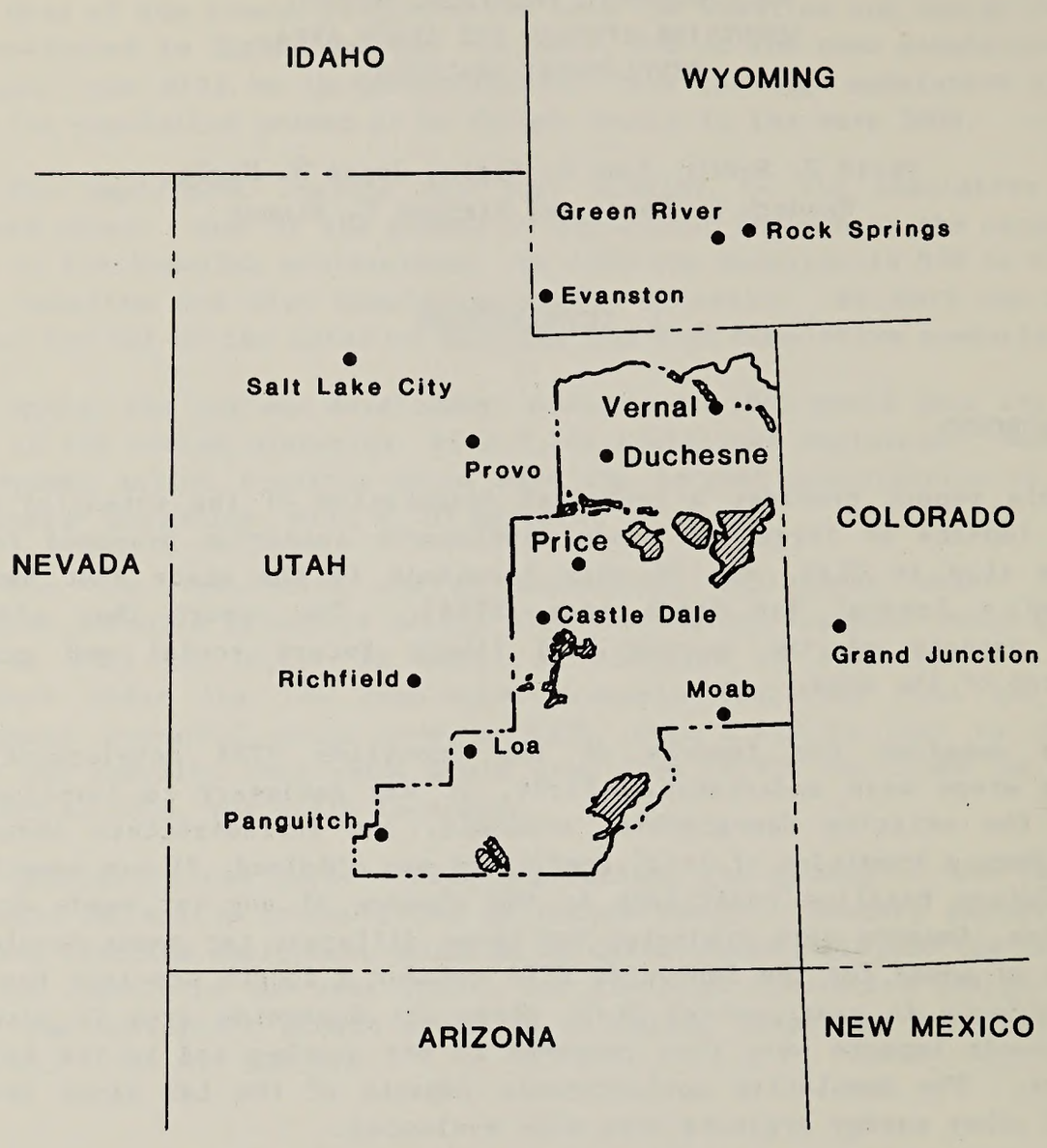

Fig. 1.1 Designated Special Tar Sands Areas in Utah: Area of Potential Impact and County Seats

created by the development of all nine of the Utah STSAs. The analysis presented in the current report considers only the potential socioeconomic impacts projected to occur as a result of the Sunnyside STSA development. The Sunnyside STSA is located in eastern Carbon County, as Fig. 1.2 shows. Figure 1.3 shows the numerous towns in Carbon and Emery counties that could be affected if the Sunnyside STSA is developed.

Pursuant to the requirements in the Combined Hydrocarbon Leasing Act, this study evaluates the socioeconomic consequences of converting oil and gas leases to combined hydrocarbon leases in the Sunnyside STSA. The consequences of that conversion would have two aspects, both of them described in this report: an areawide aspect affecting Carbon and Emery counties considered in the aggregate; and a local, or site-specific, aspect affecting each county

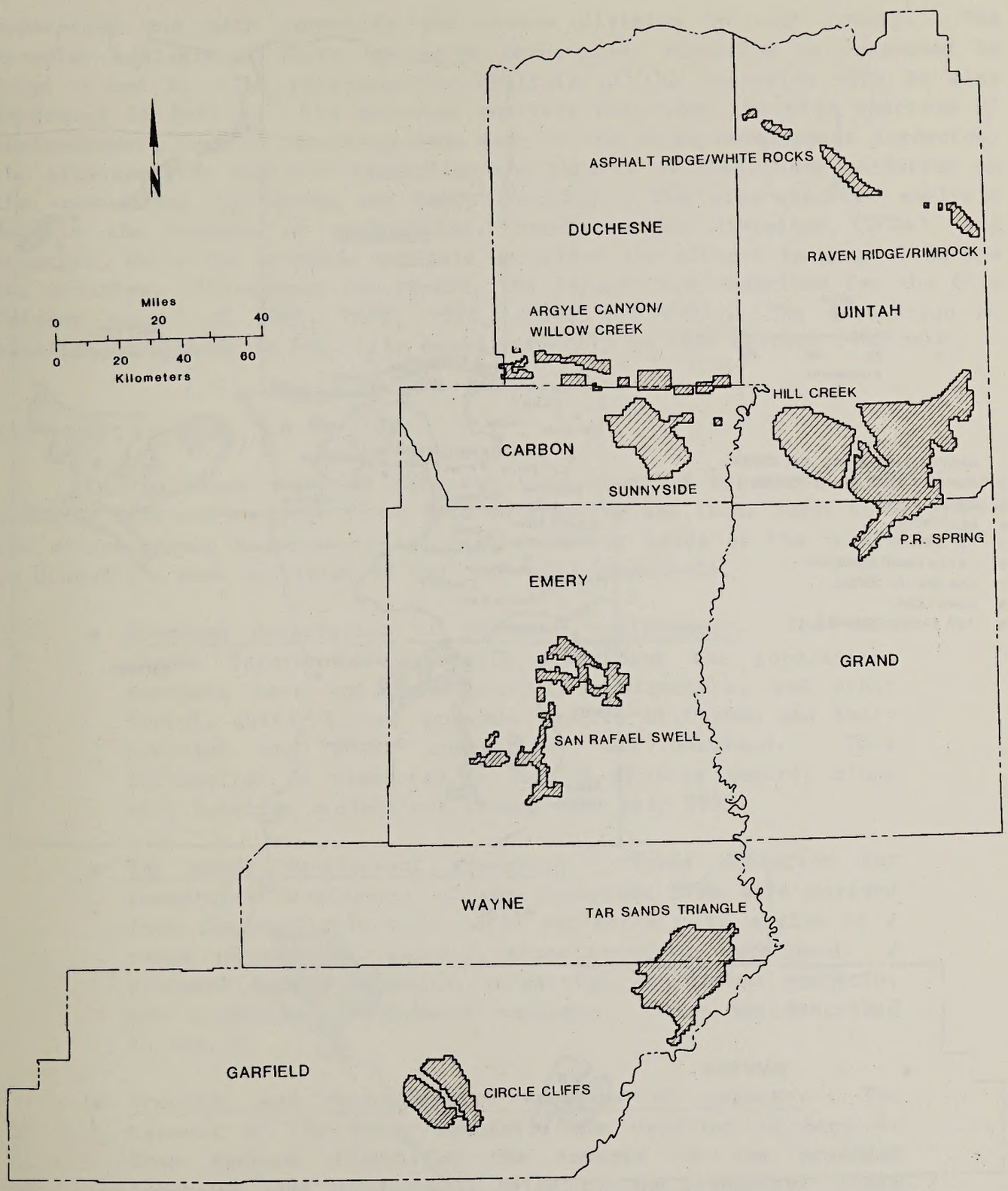

Fig. 1.2 Location of Designated STSAs within the Counties of East-Central Utah

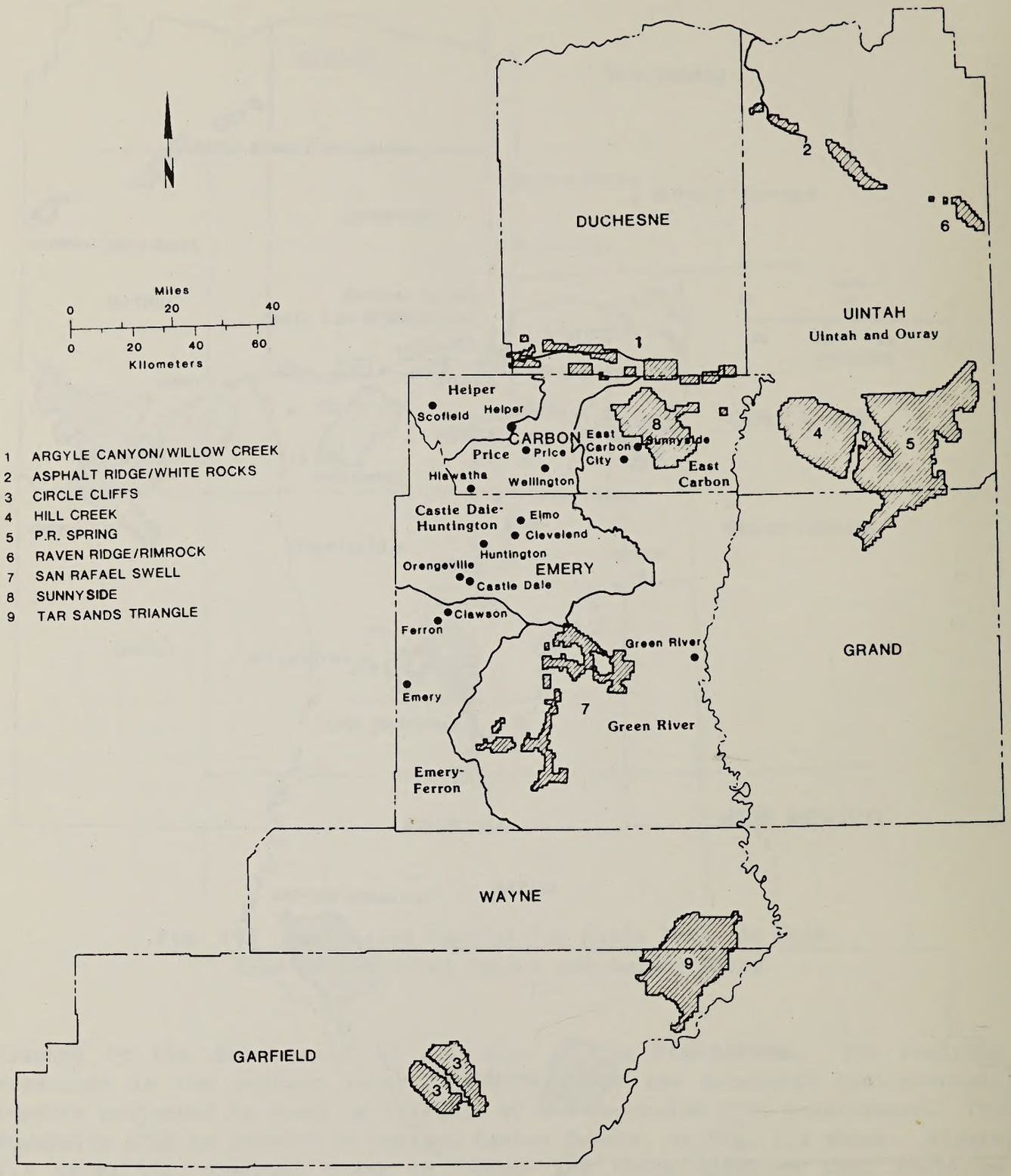

Fig. 1.3 Communities and County Census Divisions in the Two Counties Potentially Affected by the Sunnyside STSA: Carbon and Emery

separately and each community and census division in each county. The areawide analysis of three tar sands development scenarios is presented in Secs. 4 and 6. The site-specific analysis of the Sunnyside STSA is also presented in Sec. 4. The areawide analysis describes the wide spectrum of socioeconomic impacts resulting from each of the three development scenarios; the site-specific analysis identifies the impacts of these same scenarios on the communities in Carbon and Emery counties. The site-specific analysis details the impacts on communities, county census divisions (CCDs), and counties, while the areawide analysis describes the effects in general on the two counties. Throughout the report, the impacts are described for the five "window years" of 1985, 1990, 1995, 2000, and 2005. The discussion of baseline conditions in Sec. 2 is based primarily on 1980 through 1983 data.

1.2 SCOPE OF WORK

In the study reported here, we have compiled appropriate social and economic data and analyzed those data on areawide and local bases to determine the socioeconomic consequences of developing tar sands at the Sunnyside site in Utah.* The work consisted of the following components.

- Baseline description of affected environment. The most recent information available describing the population, economic base and employment, infrastructure, and other social, cultural, and economic aspects of Carbon and Emery counties and their communities was obtained. This information is presented in Sec. 2 of this report, along with baseline projections through the year 2005.

- Tar sands development scenarios. Three scenarios for commercial development of the Sunnyside STSA were derived from the available work force estimates. To arrive at a range of potential impacts, three scenarios were used: a proposed action scenario, a partial conversion scenario, and a unitized development scenario. These are described in Sec. 3.

- Areawide and site-specific analyses of impacts. The impacts of the three scenarios are detailed in Sec. 4. This section identifies the impacts of the proposed Sunnyside STSA developments by county and community. These impacts are presented relative to the impacts produced under the baseline conditions.

**Interagency Agreement between the Bureau of Land Management and the Department of Energy*, UT-930-1A3-101, p. 2.

- Consideration of other energy developments. Other potential energy developments in Carbon and Emery counties and their areawide and site-specific impacts are covered in Sec. 5.

- Evaluation of cumulative impacts. Section 6 summarizes the total impacts of the baseline changes, the development of the Sunnyside STSA, and the other energy project developments.

A Utah state government agency and university foundation made important contributions to this report. The Office of the State Planning Coordinator was designated by the Bureau of Land Management to use two of its socio-economic models for data collection and analysis. The first model, the Utah Process Economic and Demographic (UPED) model was used to project the impacts of the baseline conditions, tar sands development scenarios, and other energy projects on population, households, employment, and income. The Spatial Allocation Model (SAM) was employed to distribute these impacts among the communities, CCDs, and counties in the region. The Utah State University Foundation, under contract to Argonne, was assigned the responsibility of gathering information on the existing infrastructure in the seven counties and more than 20 communities of interest (in the tar sands area as a whole in east-central Utah).

Argonne National Laboratory (1) managed and organized the project, (2) collected information on the economic structure and existing sociocultural and housing conditions in the region, (3) analyzed and evaluated the baseline conditions and projected impacts, and (4) prepared this report.

A sequence of five principal activities was followed in the preparation of this report. First, the existing social and economic conditions of the counties potentially affected by development of the Sunnyside site were described. Impact projections in the absence of any development were then addressed. Third, the three development scenarios were described, and next, the impacts of each were projected. Finally, each set of impacts was analyzed.

1.3 STUDY CONDITIONS

The socioeconomic analyses contained in this report only address those areas that are reasonably expected to incur significant socioeconomic impacts from the Sunnyside STSA development scenarios. The counties and communities selected for inclusion in this report are those where "significant" population growth is projected as the result of the Sunnyside STSA development. "Significant" growth is defined as a 5% annual population increase over the baseline in any one year. The counties and communities of interest were chosen based on the UPED population estimates.

Throughout the report, the impacts of the Sunnyside STSA and the other project developments are expressed in terms of the difference between the baseline projections and the development projections. Thus, the increment of change created by the development is considered, rather than the total population, employment, or other impact in a given area. This clarification is also applicable to the baseline projection of infrastructure impacts.

Two important assumptions underlie the projections of the impact of the development scenarios. The first assumption is that the baseline projections (described in Sec. 2) would accurately reflect the socioeconomic composition of the counties in the time periods under study. The second assumption is that the manpower requirements of the tar sands projects (described in Sec. 3) or the other energy developments (described in Sec. 5) would not change. Any variance from these conditions would necessarily influence the validity of the projections and impact assessment.

Numerous assumptions were made in the development of the baseline projections, including the following.

- The recent national recession will not have a permanent effect on energy development in Utah or on the economy of the state in general.

- The proportion of the population in incorporated areas would remain roughly equal to the present distribution. This is in accordance with the development plans of the regional Association of Governments and county planning offices.

- The baseline projections would reflect the future based on the existing economic structure of the counties, CCDs, and communities.

- The proportional distribution of economic sector employment among CCDs would remain constant into the future.

- Inter-CCD trade patterns would continue.

- The baseline projections incorporate energy and manufacturing activities that would occur regardless of the scenario. (See Appendix A.1.1 for a delineation of the specific activities by county.)

- The baseline projections of economic activity are characterized by declining rates of growth over time. It is presumed that a local economy would stabilize as it matures. For accelerated economic growth to occur, basic sector employment must expand due to increased economic activity.

- County-level per capita income would approach the projected state per capita income. A growth rate of 1.7% per year is assumed for the state from 1985 through 2005.

A further description of the basis of the baseline projections appears in Appendix A.

Similarly, several assumptions and study conditions were employed in making the impact projections and preparing the impact assessment. Among these are:

- The alternative projections of development category impacts for the tar sands projects are compared to the baseline projections. Only the change from the baseline conditions (impact increment) would be presented and assessed.

- The manpower profiles would be provided by the Bureau of Land Management (BLM) for the construction and operation phases of the project developments.

- The UPED model and the SAM would be used to project the scenario impacts and spatially distribute the potential effects among the identified communities. The population would be spatially allocated according to commuting patterns, economic-sector trade patterns, and area self-sufficiency.

- Trading patterns would shift in some areas but not in others as a result of the tar sands development scenarios.

- Any development of the magnitude being proposed in the three scenarios would necessitate the creation of new communities in heretofore isolated areas.

- Personal income impacts are based on projected changes in population, industrial job mix, per capita income by source, and wage rates.

Appendix A contains the details of these and other assumptions and conditions used in the impact assessment process (projection and analysis).

2 DESCRIPTION OF EXISTING CONDITIONS AND BASELINE PROJECTIONS

The following section describes the existing conditions and the baseline projections of possible change in terms of the population, employment, services, and facilities in Carbon and Emery counties. Section 2.1 provides a general overview of the two-county area, and Sec. 2.2 describes its demographic conditions and trends. This is followed by Sec. 2.3, which summarizes the principal economic activities of the counties and their projections for future growth. Section 2.4 describes the infrastructure of Carbon and Emery counties, focusing on housing, education, health care, public safety, and utilities. Then, Sec. 2.5 analyzes the fiscal and management conditions of the two counties and their communities. Finally, Sec. 2.6 provides some information on the quality of life in the area.

2.1 AREAWIDE OVERVIEW

The area under consideration in this report consists of two counties in east-central Utah: Carbon and Emery. Much of east-central Utah is sparsely populated. There were only 3.2 people per square mile in the region in 1980, ranging from 0.7 per square mile in Garfield County to 15.0 per square mile in Carbon County. In the state as a whole there were 17.8 people per square mile in 1980, while the figure for the U.S. was 64.0. Price (Carbon County) and Vernal (Uintah County) were the only two communities in the region with populations greater than 4,000 in 1980. No town had a population of more than 10,000 people.

The geography of the area has an obvious influence on the limited number of settlements. Canyons, cliffs, plateaus, and rugged terrain are common in the region. Water is often in short supply. Any development has to contend with the substantial physical barriers imposed by the region.

Traditionally, most of this east-central region of Utah has depended on agriculture or energy development. As of 1980, mining was the principal employer in Carbon and Emery counties. The region is well acquainted with the cyclical nature of industrial, especially energy-related, growth. The coal industry in Carbon and Emery counties has experienced frequent boom and bust periods.

In addition to the prospect of tar sands development, there are currently numerous other energy developments in the area. Coal production in Carbon and Emery counties has been stimulated by demand from local and out-of-state industries. The mines in Carbon and Emery counties are near local population centers. Furthermore, the proposed tar sands developments in Carbon and Emery counties are also located near the same population centers.

Numerous national parks, forests, and recreation areas have been designated in the state of Utah. However, none of these areas is in close proximity to the Sunnyside Special Tar Sands Area.

2.2 DEMOGRAPHIC CONDITIONS AND TRENDS

The state of Utah grew from a population of 1,059,273 in 1970 to a population of 1,461,037 in 1980. The growth rate in Utah was 37.9% (3.27% annually) in the 1970s, making it the fifth fastest growing state in the country. This population increase fluctuated considerably from county to county and community to community within the state. Carbon and Emery are two of the most populous counties in Utah, and in the 1970s they grew more rapidly than the state as a whole.

2.2.1 County Population Trends

Table 2.1 presents the 1970 and 1980 populations of Carbon and Emery counties and the communities in them potentially affected by the Sunnyside STSA. The average annual compound percent change in population is illustrated to show the growth rate during this 10-year period. Figure 2.1 includes the highway network serving east-central Utah in addition to showing the spatial distribution of communities within Carbon and Emery counties.

Carbon County

With a population of 22,179, Carbon County was the largest of the counties in the east-central region in 1980. The county grew 42% between 1970 and 1980. Price, the largest city in the county and the region, has been a coal center since the 1890s. That city grew 3.87% annually during the 1970s, reaching a population of 9,086 in 1980. Located at the mouth of Price Canyon a few miles north of Price, Helper grew from a population of just under 2,000 in 1970 to more than 2,700 in 1980. The neighboring towns of East Carbon and Sunnyside developed to provide commercial and residential services for the coal mines in the area. East Carbon, which was incorporated in the 1970s, and Sunnyside had the lowest growth rates of any city in the county between 1970 and 1980. Wellington grew 4.31% annually during the 1970s -- the highest growth rate in Carbon County -- and had a population of 1,406 in 1980. The population of Hiawatha rose from 166 in 1970 to 249 in 1980, but it is still far below the 1,500 people who lived in the town during the coal boom days of the 1940s. Similarly, the old coal mining community of Scofield had a population approaching 2,000 in 1920, but that population later declined so drastically that even a 4% annual increase between 1970 and 1980 could only bring it up to 105.

Emery County

The population of Emery County increased by 125% between 1970 and 1980. Much of this growth can be traced to the construction of the Castle Dale Power Complex and the nearby Huntington Canyon Power Complex, the largest concentration of coal-fired electricity-generating plants in the state. The

Table 2.1 Historical Population Levels for Potentially Impacted Utah Counties and Communities, 1970 and 1980

County/Community	1970	1980	Average Annual Compound Percent Change
State of Utah	1,059,273	1,461,037	3.27
Carbon County	15,647	22,179	3.55
East Carbon	1,808[a]	1,942	0.72
Helper	1,964	2,724	3.33
Hiawatha	166	249	4.14
Price	6,218	9,086	3.87
Scofield	71	105	3.99
Sunnyside	485	611	2.34
Wellington	922	1,406	4.31
Emery County	5,137	11,451	8.35
Castle Dale	541	1,910	13.44
Clawson	_[a]	88	-
Cleveland	244	522	7.90
Elmo	141	300	7.84
Emery	216	372	5.59
Ferron	663	1,718	10.00
Green River	969	956	-0.13
Huntington	857	2,316	10.45
Orangeville	511	1,309	9.86

[a]Not incorporated in 1970.

Source: U.S. Department of Commerce, *1980 Census of Population: Number of Inhabitants, Utah* (1982).

towns nearest the plants grew most rapidly. Huntington became the largest city in the county, growing 10.45% annually to a population of 2,316 in 1980. The neighboring towns of Castle Dale, Ferron, and Orangeville had annual growth rates of 13.44%, 10.00%, and 9.86%, respectively, during the 1970s. Although Green River was the largest city in the county in 1970, its location on the eastern border of the county excluded it from the electric power plant developments. Green River was the only city in the region to lose population between 1970 and 1980. The city of Emery, while located south of the power plants, still grew by 5.59% annually between 1970 and 1980. Cleveland and Elmo shared in the growth from the power plants. Both cities doubled in population during the 1970s. Much of the population in the unincorporated areas of the county is located outside of Cleveland and Elmo.

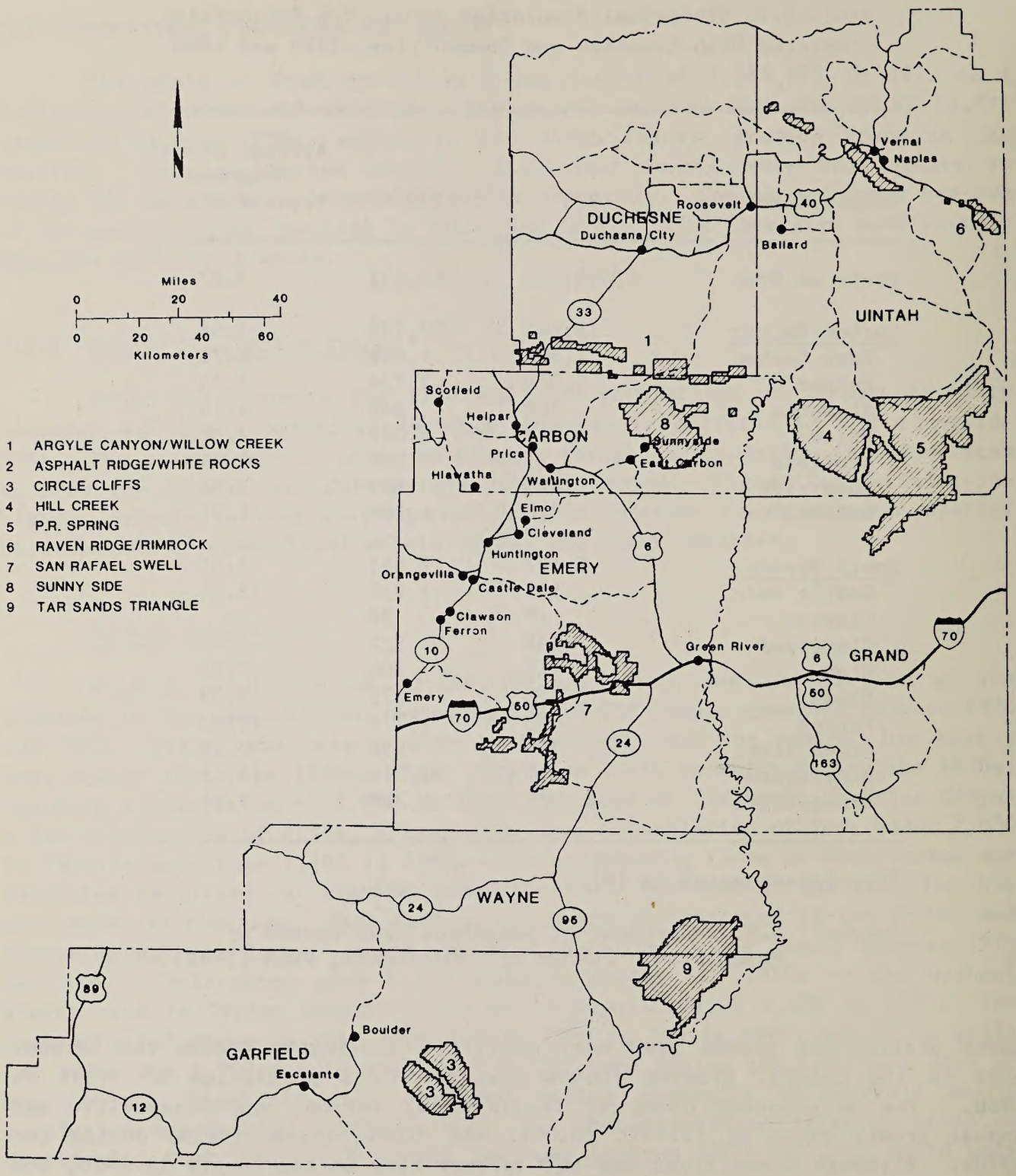

Fig. 2.1 Location of Communities in Carbon, Emery, and Nearby Counties, and the Highway Network Serving the Region

2.2.2 Demographic Composition of Carbon and Emery Counties

Figure 2.2 illustrates the 1980 distribution by county of the 80,616 people in the seven-county tar sands region in Utah. Figure 2.3 shows the distribution of population by community in Carbon and Emery counties. Table 2.2 summarizes the demographic characteristics of these two counties in 1980. The total population, population distribution by age, number of households, and households with families or retirement-age population are presented by county. Further age distributions for each county and the state are presented in Figs. 2.4-2.5.

Carbon County

Of the 22,179 residents of the county in 1980, 20.1% were of school age, 57.6% were of work age, and 9.7% were of retirement age. Figure 2.4 shows that there was a smaller portion of people in the 5-24 year age group than in the state as a whole, but that there was a higher portion in the 55 and over age group. The median age in the county in 1980 was 26.1. American Indians and blacks combined to make up 1% of the population in the county, with American Indians outnumbering blacks two to one. There were 7,242 households with an average of 3.06 people per household in the county in 1980. About 71% of these households had a married-couple family, and about 20% of the households had members of retirement age (Table 2.2).

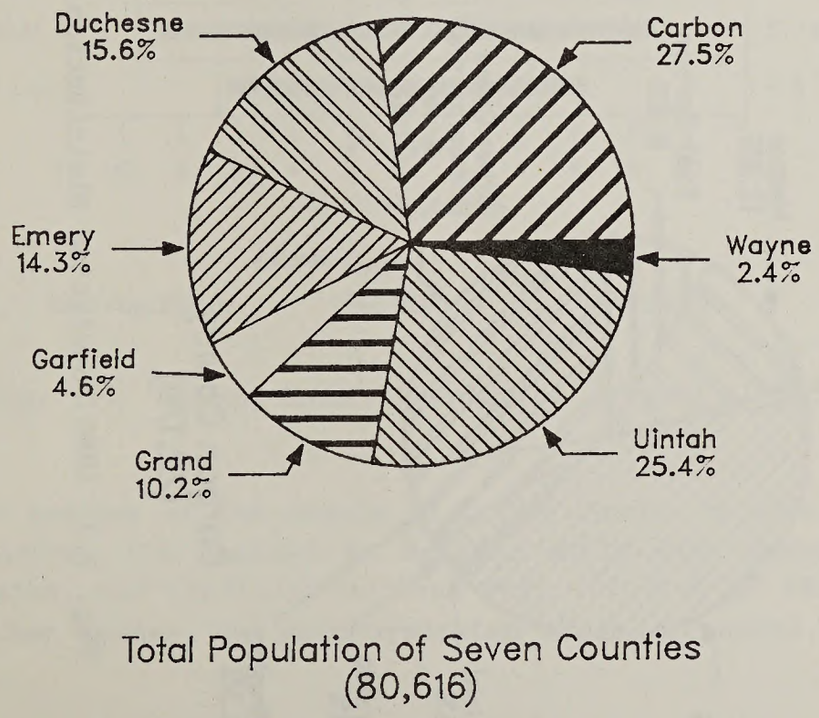

Fig. 2.2 1980 County Population Distribution in the Region

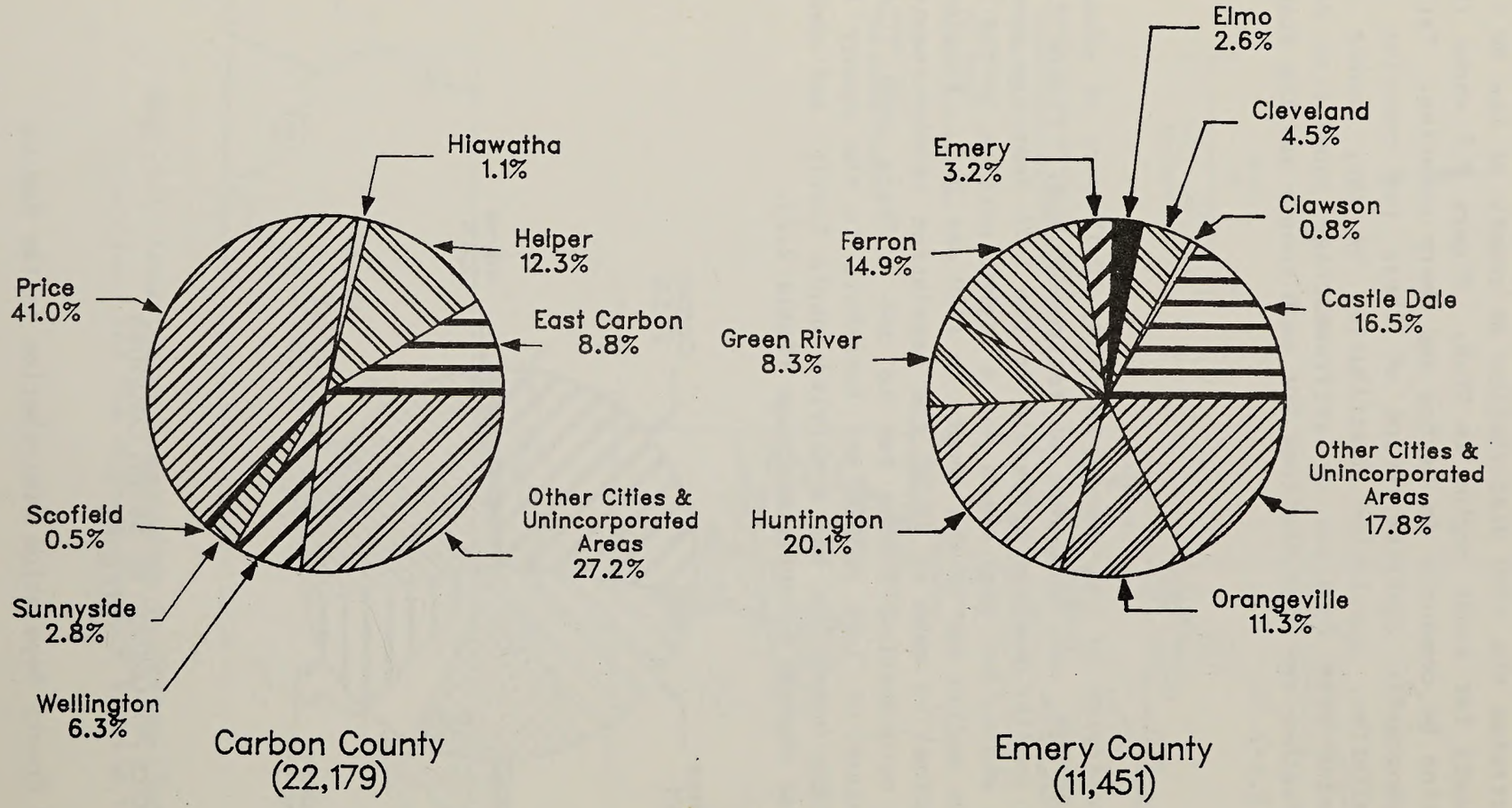

Fig. 2.3 1980 Population Distribution by Community in Carbon and Emery Counties

Table 2.2 Summary of 1980 Demographic Characteristics by County

County	Total 1980 Population	Population Distribution (%)[a] School Age	Work Age	Retirement Age	Total Number of Households	Households With Married-Couple Family (%)	Households With Retirement-Age Population (%)
Carbon	22,179	20.1	57.6	9.7	7,242	70.9	19.9
Emery	11,451	23.4	53.3	6.7	3,279	78.1	15.1

[a]School age = 5-17 years; work age = 16-64 years; retirement age $\geq$ 65 years.

Source: U.S. Department of Commerce, *1980 Census of Population: General Population Characteristics, Utah* (1982).

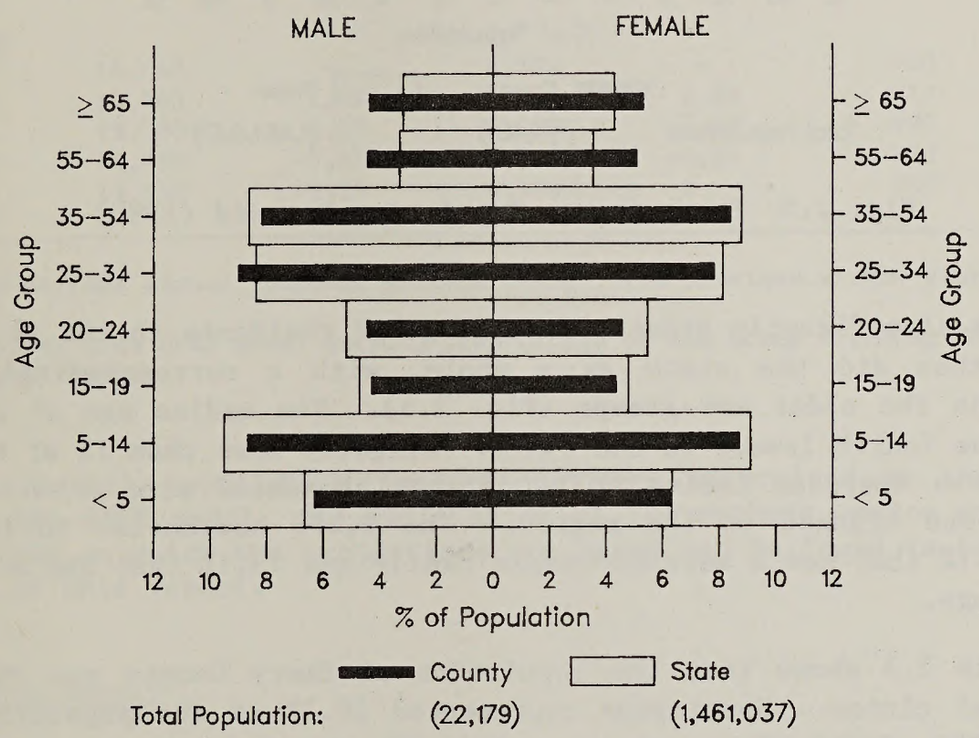

Fig. 2.4 Carbon County Population Pyramid (1980)

Forty-one percent of the people in Carbon County in 1980 lived in Price (Fig. 2.3). Another 12% resided in Helper, while East Carbon, Wellington, Sunnyside, Hiawatha, and Scofield had less than 10% each of the population in the county. Other cities and unincorporated areas accounted for 27% of the population.

Emery County

Of the 11,451 residents of Emery County in 1980, 23.4% were of school age, 53.3% were of work age, and 6.7% were of retirement age (Table 2.2). The

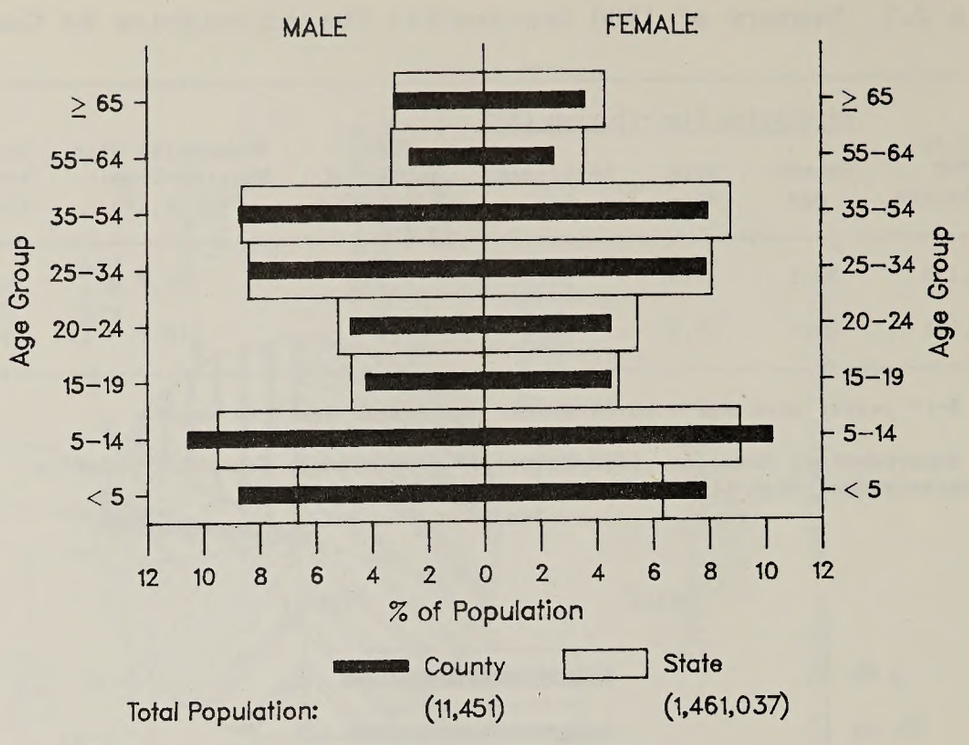

Fig. 2.5 Emery County Population Pyramid (1980)

county had a significantly greater percentage of residents in the 14 and under age group than did the state as a whole, with a correspondingly smaller percentage in the older age groups (Fig. 2.5). The median age of the county was 22.3, the fourth lowest in the state. Slightly more than 1% of the county residents were American Indian. The average household size of 3.49 in 1980 was the second highest in the region. The 3,279 households in the county included 78.1% that had a married-couple family and 15.1% that had a member of retirement age.

Figure 2.3 shows that the population of Emery County was distributed among several cities. Huntington represented 20.1% of the population in the county in 1980, Castle Dale represented 16.5%, Ferron represented 14.9%, and Orangeville represented 11.3%. Green River, Cleveland, Emery, Elmo, and Clawson each represented less than 10%. Other cities and unincorporated areas accounted for 17.8% of the population in the county.

2.2.3 Baseline Population and Households Projections

Table 2.3 presents the baseline population projections for Carbon and Emery counties from 1985 to 2005. Projections for school-age, retirement-age, and total population are included. Total population is also illustrated in Fig. 2.6. Additional detail is provided in Table 2.4, which shows baseline population projections for the cities and unincorporated areas within each CCD and county. The baseline projections for households are presented in Table 2.5, by county and community.

Table 2.3 Baseline Population Projections by Composition and County (1985-2005)

County and Window Year	Total Population		School-Age Population (5-17)		Retirement-Age Population (≥65)	
	Baseline Projection	Average Annual % Change[a]	Baseline Projection	Average Annual % Change[a]	Baseline Projection	Average Annual % Change[a]
Carbon County						
1985	29,590	-	6,800	-	2,700	-
1990	34,500	3.12	8,700	5.05	3,100	2.80
1995	36,500	1.13	9,700	2.20	3,100	0
2000	36,790	0.16	9,500	-0.42	3,100	0
2005	37,280	0.26	9,600	0.21	3,200	0.64
Emery County						
1985	14,060	-	3,800	-	900	-
1990	14,840	1.09	4,400	2.98	910	0.22
1995	15,080	0.32	4,700	1.33	900	-0.22
2000	14,730	-0.47	4,500	-0.87	870	-0.68
2005	14,550	-0.25	4,500	0	860	-0.23

[a]Computed as average annual compound percent change from previous window year.

Source: adapted from UPED model output, Utah Office of the State Planning Coordinator (June 1983).

The baseline population projections were determined by the state of Utah using the UPED model. An explanation of the methods, major assumptions, and conditions on which the projections are based can be found in Sec. 1.4 and Appendix A of this report.

Carbon County

The population of Carbon County is projected to increase from 29,590 in 1985 to 37,280 in 2005 (Table 2.3). This would be a 68% increase from 1980, the largest increase projected for any county in the region. The most rapid growth is forecast to occur between 1985 and 1990 (3.12% annually), with declining growth rates expected thereafter. School-age population would increase more rapidly than total population between 1985 and 1995, but it would actually decrease between 1995 and 2000. Retirement-age population is projected to grow 2.80% annually to 3,100 in 1990, where it would remain steady until an increase of 100 in 2005.

Most of the population increase is expected to occur in the Price CCD, and especially in Price, Wellington, and the unincorporated areas. This is shown in Table 2.4. In these areas, the population is projected to grow from 2 to 3% annually between 1985 and 1995 and only marginally in the following 10 years. Growth in the Helper CCD would be about 1.4% annually between 1985 and

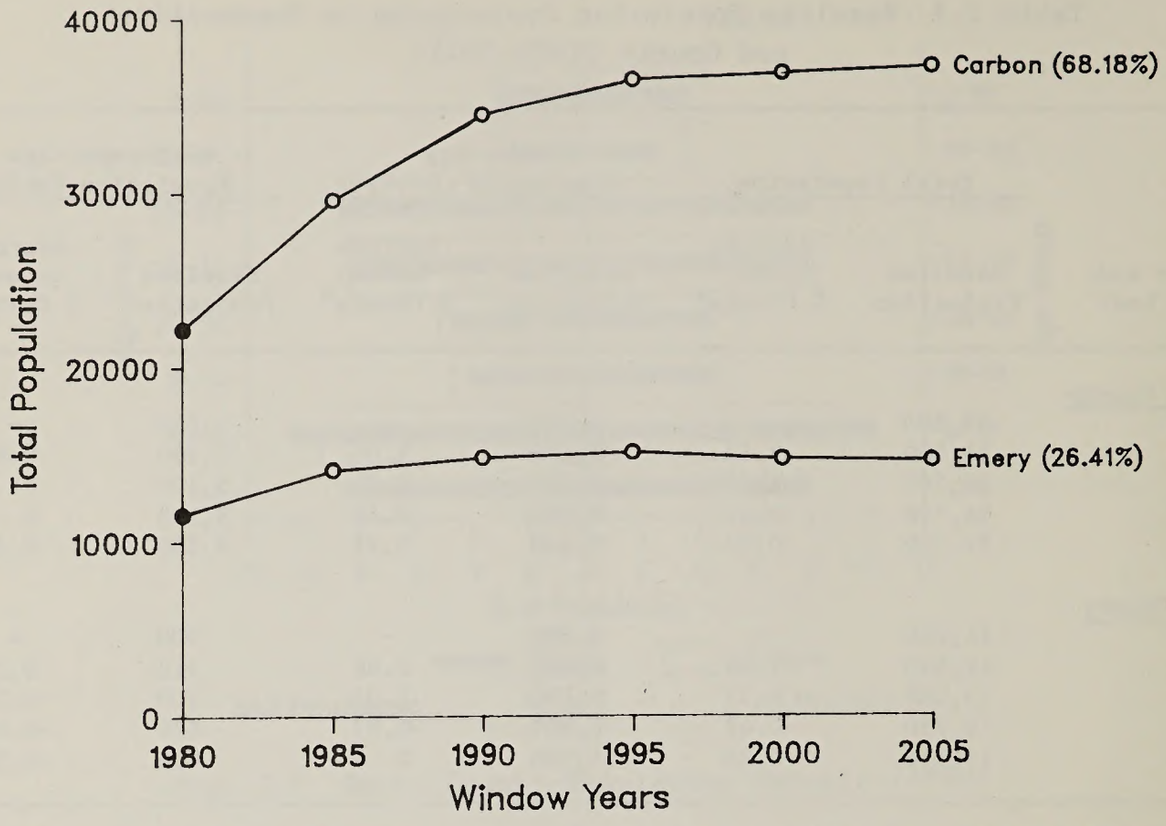

Fig. 2.6 Baseline Population Projections by County, 1980-2005
(% of change from 1980 to 2005 in parenthesis)

1995 and 0.25% annually or less between 1995 and 2005. Helper, Scofield, and the unincorporated areas would each follow the growth pattern of the CCD as a whole. Population in the East Carbon CCD is projected to decline throughout the period. The drop would be as high as 6.70% annually in the unincorporated areas between 1985 and 1995.

The number of households in Carbon County is expected to increase from 9,460 in 1985 to 11,700 in 2005. Most of this growth (1.79% annually) will take place during the first 10 years, with less growth (0.35% annually) in the following 10 years. This growth pattern is illustrated in Table 2.5. In the Price CCD and the Helper CCD, the increase in households would be less than population growth between 1985 and 1995 and greater than population growth between 1995 and 2005. Household growth is projected to be 2.37% annually between 1985 and 1995 in the Price CCD, and would range from 1.34% annually in Hiawatha to 2.56% annually in Price. The increase would be about half as great in the Helper CCD as in the Price CCD between 1985 and 1995, but both CCDs and the towns therein are forecast to increase from 0 to 0.6% annually between 1995 and 2005. The number of households in the East Carbon CCD would decrease 3.69% annually from 1985 to 1995 and 1.14% annually from 1995 to 2005.

Table 2.4 Baseline Population Projections by County and Community[a,b] (1985-2005)

County/Community	Population Projections, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Carbon County	29,590	34,500	36,500	36,790	37,280	2.12	0.21
East Carbon CCD	2,060	1,600	1,500	1,390	1,320	-3.12	-1.27
East Carbon	1,550	1,210	1,130	1,050	995	-3.11	-1.26
Sunnyside	490	380	360	330	315	-3.04	-1.33
Unincorp. Areas	20	10	10	10	10	-6.70	0
Helper CCD	5,880	6,540	6,750	6,750	6,910	1.39	0.23
Helper	3,490	3,900	4,000	4,000	4,100	1.37	0.25
Scofield	130	140	150	150	150	1.44	0
Unincorp. Areas	2,260	2,500	2,600	2,600	2,660	1.41	0.23
Price CCD	21,650	26,360	28,250	28,650	29,050	2.70	0.28
Hiawatha	230	260	250	250	250	0.84	0
Price	13,300	16,300	17,700	18,200	18,500	2.90	0.44
Wellington	2,140	2,600	2,800	2,800	2,800	2.72	0
Unincorp. Areas	5,980	7,200	7,500	7,400	7,500	2.29	0
Emery County	14,060	14,840	15,080	14,730	14,550	0.70	-0.36
Castle Dale-Huntington CCD	9,770	10,490	10,600	10,380	10,200	0.82	-0.38
Castle Dale	2,650	2,900	3,000	2,900	2,850	1.25	-0.51
Cleveland	580	610	620	610	600	0.67	-0.33
Elmo	350	380	380	370	360	0.83	-0.54
Huntington	2,850	3,000	3,000	2,900	2,850	0.51	-0.51
Orangeville	1,870	2,000	2,000	2,000	1,970	0.67	-0.15
Unincorp. Areas	1,470	1,600	1,600	1,600	1,570	0.85	-0.19
Emery-Ferron CCD	3,280	3,210	3,310	3,180	3,180	0.10	-0.40
Clawson	270	260	260	250	250	-0.38	-0.39
Emery	480	480	490	480	480	0.21	-0.21
Ferron	2,250	2,200	2,300	2,200	2,200	0.22	-0.44
Unincorp. Areas	280	270	260	250	250	-0.74	-0.39
Green River CCD	1,010	1,140	1,170	1,170	1,170	1.48	0
Green River	870	980	1,000	1,000	1,000	1.40	0
Unincorp. Areas	140	160	170	170	170	1.96	0

[a]Totals may not add due to rounding.

[b]County Census Division (CCD).

Source: adapted from UPED model output, Utah Office of the State Planning Coordinator (June 1983).

Table 2.5 Baseline Household Projections by County and Community[a,b] (1985-2005)

County/Community	Household Projections, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Carbon County	9,460	10,850	11,300	11,520	11,700	1.79	0.35
East Carbon CCD	670	500	460	430	410	-3.69	-1.14
East Carbon	500	380	350	330	310	-3.50	-1.21
Sunnyside	160	120	110	100	100	-3.68	-0.95
Unincorp. Areas	5	4	3	3	3	-4.98	0
Helper CCD	1,880	2,060	2,110	2,130	2,170	1.16	0.28
Helper	1,110	1,220	1,250	1,260	1,280	1.19	0.23
Scofield	40	40	50	50	50	2.26	0
Unincorp. Areas	730	800	810	820	840	1.05	0.36
Price CCD	6,910	8,290	8,730	8,960	9,120	2.37	0.43
Hiawatha	70	80	80	80	80	1.34	0
Price	4,250	5,130	5,470	5,690	5,790	2.56	0.57
Wellington	680	820	860	880	900	2.38	0.46
Unincorp. Areas	1,910	2,260	2,320	2,310	2,350	1.96	0.13
Emery County	3,920	4,030	4,070	4,030	3,970	0.38	-0.25
Castle Dale-Huntington CCD	2,720	2,850	2,860	2,830	2,780	0.50	-0.28
Castle Dale	730	790	800	790	780	0.92	-0.25
Cleveland	160	170	170	170	160	0.61	-0.60
Elmo	100	100	100	100	100	0	0
Huntington	790	810	800	790	780	0.13	-0.25
Orangeville	520	540	550	540	530	0.56	-0.37
Unincorp. Areas	420	440	440	440	430	0.47	-0.23
Emery-Ferron CCD	930	870	880	870	870	-0.55	-0.11
Clawson	80	70	70	70	70	-1.33	0
Emery	140	130	130	130	130	-0.74	0
Ferron	630	600	610	600	600	-0.32	-0.17
Unincorp. Areas	80	70	70	70	70	-1.33	0
Green River CCD	270	310	330	330	320	2.03	-0.31
Green River	230	270	280	280	270	1.99	-0.36
Unincorp. Areas	40	40	50	50	50	2.26	0

[a]Totals may not add due to rounding.

[b]County Census Division (CCD).

Source: adapted from UPED model output, Utah Office of the State Planning Coordinator (June 1983).

Emery County

Table 2.3 indicates that the Emery County population would increase from 14,060 in 1985 to 14,550 in 2005. Most of the 3.5% increase between 1985 and 2005 is projected to take place by 1990. The population of the county is expected to reach a peak of 15,080 in 1995 and would decline by 0.36% annually after 1995. School-age population would grow more rapidly than the total population through 1995, at which time it would drop 0.87% annually in the next five years and remain constant through 2005. After an increase of 10 people between 1985 and 1990, retirement-age population is forecast to decrease to 860 in 2005.

The most rapid growth in population is projected to occur in the Green River CCD (Table 2.4). The city of Green River would grow 1.40% annually between 1985 and 1995, and the unincorporated areas would increase 1.96% annually during the same period. The population of the Green River CCD is projected to remain constant from 1995 until 2005. The Castle Dale-Huntington CCD would grow somewhat more rapidly than the Emery-Ferron CCD through 1995, although neither CCD would grow by more than 1% annually. There is projected to be considerable variation in the population changes in the cities of these two CCDs between 1985 and 1995; the difference would range from a 1.25% annual increase in Castle Dale to a 0.74% decline in the unincorporated areas of the Emery-Ferron CCD. The populations of the Castle Dale-Huntington CCD and the Emery-Ferron CCD are forecast to have annual decreases of 0.38% and 0.40%, respectively, after 1995, with little variation expected among the cities.

The number of households in Emery County is projected to change only slightly, from 3,920 in 1985 to 3,970 in 2005 (Table 2.5). A peak of 4,070 households would be reached in 1995. This would be followed by a 0.25% annual decrease. The change in the number of households would reflect the projected change in population in each CCD, with the exception of the 0.5% annual decrease in households expected in the Emery-Ferron CCD from 1985 to 1995.

2.3 ECONOMIC BASE, EMPLOYMENT, AND INCOME TRENDS

The primary economic activities in each county are described in this section. A profile of the historic and current economic base of each county, the employment trends in each county since 1970, and the baseline employment projections are used to describe the economy of the area (Secs. 2.3.1 and 2.3.2). The final component of the economy addressed here, in Sec. 2.3.3, is wages and income, discussed in terms of historical and projected monthly averages.

2.3.1 Economic Profile of Tar Sands Development Areas

A narrative description of the economic history of each county and community is presented here. The proportion of industrial sectors that would

potentially support future energy developments is also included. Sectoral information for mining, contract construction, and manufacturing in 1981 was drawn from recent U.S. Census material. The number of workers in each county in 1981 does not include government employees, railroad employees, and self-employed persons.

Carbon County

Traditionally, Carbon County has relied heavily on the extensive coal industry in the area. It has experienced the boom and bust cycle of energy development. Price has been the coal capital of Utah since the nineteenth century. The number of working mines near Price has fluctuated from 22 in 1910 to 69 in 1949. Most of the coal has been shipped by railroad to steel smelting plants on the West Coast. East Carbon, Hiawatha, and Sunnyside all developed as company towns for the coal industry. Helper is also a coal town, but it is somewhat of a regional center and has a more diversified economy. Scofield is an old coal mining community that threatened to become a ghost town several years ago. Wellington, unlike the rest of the county, is a farming, trade, and residential center.

Of the 6,040 workers in Carbon County in 1981, 52% were in mining, contract construction, and manufacturing. Sixty-one of the 438 business establishments in the county in 1981 were in those three sectors. Mining establishments were commonly the largest in the county.

Emery County

Coal mining and agriculture have long constituted the two-part economic base of Emery County. The construction of the Castle Dale Power Complex and the Huntington Canyon Power Complex by the Utah Power and Light Co. during the 1970s transformed many of the communities in the area. Originally quiet agriculture towns, Huntington, Castle Dale, Orangeville, and Ferron have been greatly affected by the increased mining and production of electricity. Cleveland, Elmo, and Emery have been changed to a lesser degree. Green River, located on Interstate Highway 70 in the eastern part of the county, has become increasingly dependent on the considerable tourist trade in the area.

Of the 3,695 workers in Emery County in 1981, 2,098 were in mining, between 500 and 1000 were in contract construction, and between 20 and 100 were in manufacturing. The majority of the work force continues to be employed in one of those three growth sectors. Of the 143 business establishments in the county in 1981, six were in mining, 13 in contract construction, and two in manufacturing. One of the mining establishment operations had more than 1,000 employees, and one contract construction establishment had an employment of between 500 and 1,000.

2.3.2 Employment Patterns: Historical and Projected

Employment Sector History

Table 2.6 shows the historical county employment levels by economic sector for 1970, 1975, and 1980. The annual employment data by county between 1970 and 1980 are presented in Appendix B, Tables B.1 and B.2.

Carbon County. Total employment in Carbon County increased from 5,390 in 1970 to 9,385 in 1980. Growth in the number of employed workers was more than two times faster between 1975 and 1980 than between 1970 and 1975. Employment in the finance, insurance, and real estate sector increased most

Table 2.6 Historical County Employment Levels, by Economic Sector (1970-1980)[a]

	Sectoral Employment, by Year			Average Annual Compound Percent Change		Sectoral Employment, by Year			Average Annual Compound Percent Change	
Economic Sector	1970	1975	1980	1970-1975	1975-1980	1970	1975	1980	1970-1975	1975-1980
	Carbon County					Emery County				
Agriculture	249	214	226	-2.98	1.10	452	468	464	0.70	-0.17
Mining	987	1,350	2,325	6.46	11.49	366	1,061	2,105	23.72	14.69
Contract Construction	128	220	338	5.57	8.97	b	587	522	c	-2.32
Manufacturing	187	276	281	8.10	0.36	b	b	22	c	c
Transportation, Communication, and Utilities	460	455	650	-0.22	7.39	34	152	513	34.92	27.54
Wholesale and Retail Trade	922	1,190	1,762	5.24	8.17	161	245	335	8.76	6.46
Finance, Insurance, and Real Estate	135	277	242	15.46	-2.67	b	b	65	c	c
Services	464	567	1,083	4.09	13.82	63	205	225	26.61	1.88
Government	1,388	1,408	1,828	0.29	5.36	370	350	716	-1.11	15.39
Nonfarm Proprietors	470	508	650	1.57	5.05	104	233	485	2.69	15.79
Total	5,390	6,465	9,385	3.70	7.74	1,825	3,326	5,452	12.75	10.39

[a]Totals may not add due to rounding.

[b]Not available.

[c]Undefined.

Source: Utah Department of Employment Security, selected annual reports (1970-1980), and U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (REIS).

rapidly between 1970 and 1975, while employment in the services sector increased most rapidly between 1975 and 1980. The number of workers in the mining, contract construction, and manufacturing sectors grew 126% between 1970 and 1980. Mining was the largest sector in 1980, followed by government and wholesale and retail trade.

Emery County. The total employment of 5,452 in Emery County in 1980 represented a 199% increase since 1970. The number of workers grew more than 10% annually throughout the period. The most rapid growth was in the transportation, communication, and utilities sector, which increased 34.92% annually between 1970 and 1975 and 27.54% annually between 1975 and 1980. The number of jobs in the mining sector rose from 366 in 1970 to 2,105 in 1980. The number of jobs in the contract construction and manufacturing sectors totaled 544 in 1980, but no data were available for those sectors in 1970. Mining had 1,389 employees in 1980, more than government, the next largest sector in the county.

Projections of Baseline Employment

The baseline employment projections describe the future of the counties based on the existing and future economic structure and the changing demographic characteristics of the population. The projections are not a prediction of the future but rather an attempt to depict the likely direction of current trends in the area without tar sands development. Characteristic of the baseline projections are declining rates of growth over time. It is assumed that with a given economic structure, an area will begin to stabilize as its economy matures. Under these conditions, accelerated growth would require increases in the basic employment sectors that would change the economic structure of the area. The Utah Process Economic and Demographic (UPED) impact projection model and the Spatial Allocation model (SAM) were applied in making the baseline projections (see Sec. 1.4 and Appendix A).

Obviously a recession of the magnitude experienced recently will have an impact on the baseline projections for Utah. The projections presented herein were produced for the State of Utah* before the severity of the 1981-82 national recession and its full impact on the state of Utah became apparent. These projections assume that the national recession would have ended in 1982, that recovery would occur during 1983, and that 1983 would be a growth year. The projections also assume that the recession will have no permanently deleterious structural effect on the energy and mineral industries in the state or on the economy in general. The validity of this assumption cannot be determined until a national recovery is well under way.

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*The projections were prepared by the State of Utah, Office of the State Planning Coordinator.

Figure 2.7 illustrates the change in baseline employment projected between 1980 and 2005. It is evident from this figure that both counties are projected to experience some employment growth between 1980 and 2005. The fastest rate of increase appears to be in the period 1980-85 for both counties. However, Carbon County is expected to remain on an almost continuous growth trend throughout the period, while relatively little change is forecast for Emery County between 1985 and 2005 -- less than 1% annually in most economic sectors. A detailed description of the baseline employment projections by economic sector for each county is presented in Tables 2.7 and 2.8 and discussed below.

Carbon County. In Carbon County, the baseline projections of employment assumed a rapid growth in coal production between 1980 and 1990. Recent layoffs in the industry make it appear that the short-term projections might have been overstated. It is still too early to tell whether or not the longer term projections for the coal industry have been overstated. The projects that would create the demand for the coal are described under Emery County. After 1990, coal production is assumed to remain stable. Other sectors that would drive growth in the local economy are assumed to follow historical paths throughout the projection period.

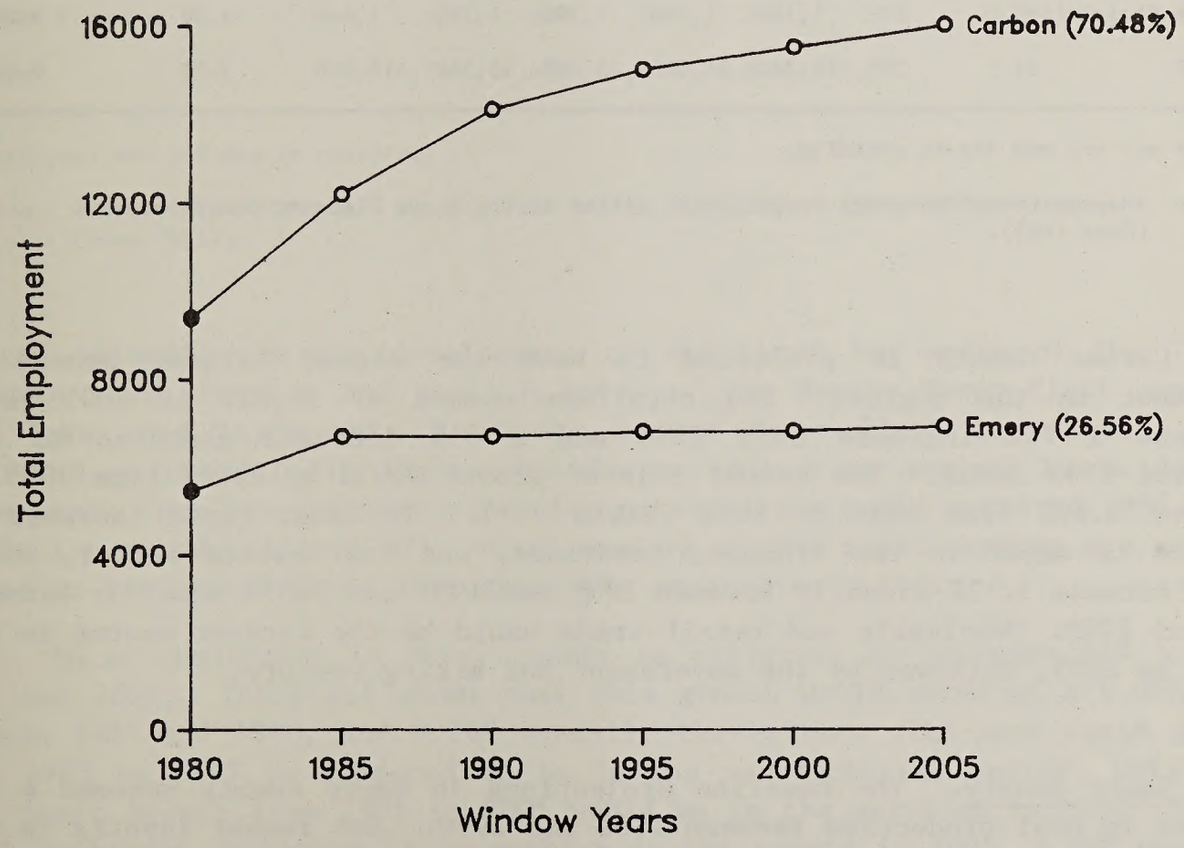

Fig. 2.7 Baseline Projections of Total Area Employment by County, 1980-2005 (1980-2005 percent changes in parentheses)

Table 2.7 Baseline Employment Projections by Economic Sector -- Carbon County (1985-2005)[a]

Economic Sector	Sectoral Employment, by Year (number of workers)					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	230	230	230	240	240	0	0.43
Mining	2,460	2,860	2,860	2,860	2,860	1.52	0
Contract Construction	490	550	590	610	630	1.87	0.66
Manufacturing	320	360	390	420	450	2.00	1.44
Transportation, Communication, and Utilities	920	970	1,100	1,200	1,250	1.80	1.29
Wholesale and Retail Trade	2,260	2,590	2,890	3,090	3,300	2.49	1.34
Finance, Insurance, and Real Estate	360	430	490	540	590	3.13	1.87
Services	1,580	1,890	2,090	2,190	2,300	2.84	0.96
Government	2,470	2,880	2,970	2,970	3,000	1.86	0.10
Nonfarm Proprietors	1,150	1,290	1,390	1,390	1,400	1.91	0.07
Total	12,240	14,050	15,000	15,510	16,020	2.05	0.66

[a]Totals may not add due to rounding.

Source: adapted from UPED model output, Utah Office of the State Planning Coordinator (June 1983).

Carbon County is projected to have the second largest growth in employment in the region. The total employment of 16,020 in 2005 would represent a 71% increase over 1980 and a 31% increase compared to the projected 1985 level. The annual rate of growth would be 2.05% from 1985 to 1995 and 0.66% from 1995 to 2005 (Table 2.7). The most rapid increase is expected to occur in the finance, insurance, and real estate sector, which would increase 3.13% annually between 1985 and 1995 and 1.87% annually between 1995 and 2005. Wholesale and retail trade would be the largest sector in the county in 2005, followed by the government and mining sectors.

Emery County. The baseline projections in Emery County assumed a 71% increase in coal production between 1980 and 1990. But recent layoffs in the industry would tend to indicate that the short-term projections might have been overstated. It is not yet possible to determine whether or not the longer term projections for the coal industry have been overstated. After 1990, coal production is assumed to remain stable. The demand for coal is

Table 2.8 Baseline Employment Projections by Economic Sector -- Emery County (1985-2005)[a]

Economic Sector	Sectoral Employment, by Year (number of workers)					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	360	360	360	370	370	0	0.27
Mining	2,460	2,500	2,500	2,500	2,500	0.16	0
Contract Construction	850	440	470	480	500	-5.75	0.62
Manufacturing	40	50	50	50	50	2.26	0
Transportation, Communication, and Utilities	720	820	840	860	880	1.55	0.47
Wholesale and Retail Trade	630	670	700	700	730	1.06	0.42
Finance, Insurance, and Real Estate	60	60	70	70	70	1.55	0
Services	340	380	400	430	450	1.64	1.18
Government	770	840	840	810	800	0.87	-0.49
Nonfarm Proprietors	500	530	540	530	530	0.77	-0.19
Total	6,730	6,650	6,770	6,800	6,880	0.06	0.16

[a]Totals may not add due to rounding.

Source: adapted from UPED model output, Utah Office of the State Planning Coordinator (June 1983).

created primarily by the development of the first two units of the Intermountain Power Project and units 3 and 4 of the Hunter Power Plant complex. Utah Power and Light unit 3 of the Hunter Power Plant is assumed to be completed on schedule in 1983. The Hunter unit 4 is assumed to be delayed three years from its original schedule; construction would begin in 1985, with completion scheduled in 1987. Other sectors of the local economy are assumed to follow historical paths throughout the projection period.

Total employment in Emery County is projected to increase 26% between 1980 and 2005. Table 2.8 shows that this growth would occur at a 0.06% rate between 1985 and 1990, and 0.16% annually thereafter. The most rapid growth from 1985 to 1995 is expected to be in the manufacturing sector, while the most rapid growth from 1995 to 2005 would be in the services sector. Of the 6,880 employees projected to be working in the county in 2005, 2,500 would be working in the mining sector. Transportation, communication, and utilities would be the next largest employment sector, accounting for 880 jobs in 2005.

2.3.3 Trends in Monthly Wages and Personal Income

This section discusses the average monthly wages by sector and county and the total and per capita income by county. Also included is a projection of total personal income between the years 1985 and 2005. All data are provided in constant 1980 dollars (1980 $).

Average Monthly Wages by Sector and County (1975-1980)

The average monthly wages for each major nonagricultural employment sector are provided in Table 2.9 by county. Only the 1980 wage level is presented with the 1975-1980 growth rate; Table B.3 in Appendix B contains the annual data.

The mining; construction; and transportation, communications, and utilities sectors have shown the highest average wage levels during the 1975-1980 time period. Under the baseline projections and proposed scenario developments, increased employment would be primarily concentrated in the mining and construction sectors. Each sector is briefly described below.

Mining. Overall, mining jobs commanded the highest wages of any economic sector through 1980. The highest wages for mining in east-central Utah are found in Carbon County ($1,980 per month) and Emery County ($1,966 per month). Both counties experienced steady growth in wages throughout the 1970-1980 period (see Table B.3 in Appendix B). Mining wages in Carbon County increased by 8.23% annually between 1975 and 1980, while in Emery County the mining wages grew by 9.49%. These rates of growth were among the highest in both counties.

Contract Construction. Emery County had by far the highest wage level in this sector, with an average monthly wage of $2,410 in 1980. This figure was almost $1,000 more than the wage in Carbon County ($1,401). Emery County showed a dramatic increase in the level of contract construction wages paid during the period, with an annual increase of 8.65% (an increase of 65% over the five-year period). Carbon County wages in this sector changed by 5.80% annually between 1975 and 1980. Finally, Emery County was the only county in east-central Utah that showed a steady increase in construction wages over the five-year period. Contract construction wages in Carbon County fluctuated, before reaching $1,401/month in 1980.

Manufacturing. The average monthly wages paid for manufacturing employment in Carbon and Emery counties were roughly the same. This wage level is roughly in the middle of the range prevalent in east-central Utah. Both Carbon and Emery counties experienced a cyclical pattern over the five-year period in terms of the monthly wages paid to manufacturing employment.

Table 2.9 Average Monthly Nonagricultural Wages by Economic Sector and County: 1980 and Rate of Change (1980 $)

	Carbon County		Emery County	
Economic Sector	1980	Average Annual % Change[a] 1975-1980	1980	Average Annual % Change[a] 1975-1980
Mining	1,980	8.23	1,966	9.49
Contract Construction	1,401	5.80	2,410	8.65
Manufacturing	820	4.83	882	[b]
Transportation, Communication, and Utilities	1,725	8.49	1,777	11.62
Wholesale and Retail Trade	775	8.50	490	5.82
Finance, Insurance, and Real Estate	849	2.32	806	[b]
Services	704	10.11	716	13.44
Government	855	4.97	842	6.11

[a]Computed as the compound average annual percent change.

[b]Undefined.

Source: adapted from Utah Department of Employment Security, selected annual reports (1975-1980).

Transportation, Communication, and Utilities. Within the east-central region, Emery and Carbon counties had the highest average monthly wage in this sector for 1980, at $1,777 and $1,725, respectively. Once again, the wages paid in the two counties for this type of work were almost identical. Emery County showed the greatest increase in average monthly wages during the period studied. The $1,777/month paid to Emery County workers in 1980 was 93% higher than the 1975 monthly wage in this sector. Carbon County workers also realized wage increases of 60% or more over the five-year period. Emery and Carbon counties both recorded steady monthly wage increases over the entire period (see Table B.3, Appendix B).

Wholesale and Retail Trade. Of all economic sectors, the average monthly wages in this sector were the lowest paid in Emery County, and the second lowest in Carbon County. Both counties showed increases in the level of wages paid over the period. The greatest percentage increase in average monthly wages occurred in Carbon County (8.5% annually), while Emery County had a 5.82% annual rate of growth in wages.

Finance, Insurance, and Real Estate. All counties in the east-central region of Utah show a 1980 wage level in this sector of around $800/month, with Carbon and Emery jobs paying $849 and $806, respectively. In this sector, as in most others, there was considerable wage movement throughout the period. Only in Emery County did monthly wages show an increase in each year evaluated.

Services. Average monthly wages in this sector were $704 and $716 in Carbon and Emery counties, respectively. Service-sector wages in all counties in the region fell to the monthly range of $640 to $787. Carbon and Emery counties experienced substantial annual increases in average monthly wages, 10.11% and 13.44%, respectively. These annual rates were the highest rates of change in the 1975-80 period for all industrial sectors. Fluctuations in the wage levels by county are again evident throughout the period (see Table B.3, Appendix B). Average monthly wages in Carbon County increased each year throughout the period.

Government. All counties in the region have an average monthly wage in the range of $784 to $855. Carbon and Emery government workers were paid average monthly wages of $855 and $842 in 1980, respectively. Almost all counties experienced rapid wage increases over the period. Emery County had a 6.11% increase per year.

Total and Per Capita Personal Income by County

This section analyzes the trends in total and per capita personal income by county from 1970 to 1980. The county figures are also related to state figures for the same period. County per capita personal income and the ratio of county to state per capita income are shown in Table 2.10. Table B.4 in Appendix B displays the total personal income data by county for the years 1970-1980. All data are presented in 1980 dollars.

Per capita income has increased in both Carbon and Emery counties from 1970 to 1980. However, neither county increased at a steady or continuous rate. Moreover, there were some years when per capita income declined

Table 2.10 County Per Capita Personal Income (PCPI) and Ratio of County to State Per Capita Income, 1970-1980 (1980 $)

Year	State of Utah, PCPI	Carbon County		Emery County	
		PCPI	Ratio	PCPI	Ratio
1970	6,825	6,409	0.9390	4,852	0.7109
1971	7,005	6,298	0.8991	4,183	0.5971
1972	7,347	6,840	0.9310	5,221	0.7106
1973	7,531	7,272	0.9656	6,000	0.7967
1974	7,439	7,355	0.9887	5,801	0.7798
1975	7,382	7,759	1.0511	5,948	0.8057
1976	7,693	8,264	1.0742	6,639	0.8630
1977	7,890	8,583	1.0878	7,094	0.8991
1978	8,076	8,964	1.1100	7,385	0.9144
1979	8,096	10,489	1.2956	8,078	0.9978
1980	7,631	9,105	1.1932	6,810	0.8924

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Table 5, (April 1982) and the Utah Population Committee.

relative to the prior year. Figure 2.8 illustrates the pattern of personal income growth exhibited in the two counties. The state per capita income increased by 12% over the 10-year period. Total personal income for the state increased by 55% between 1970 and 1980. A description of the county trends follows.

Carbon County. Carbon County experienced a 42% increase in per capita personal income from 1970 to 1980. In 1979, per capita income peaked at $10,489; this was also the highest per capita income in any county of east-central Utah during the 10-year period. The annual change in Carbon County per capita income was gradual; the biggest increase came in 1979 (17% over the 1978 figure). The largest decrease during the period occurred in 1980, when the figure was 13% below 1979.

In 1980, the ratio of per capita personal income (PCPI) in Carbon County to that of the state was 1.1932. This compares to a ratio of 0.939 in 1970. In 1979, the ratio of per capita incomes was 1.2956; the highest ratio for any county during the 1970-1980 period. PCPI in Carbon County has been larger than the corresponding state figure every year since 1975.

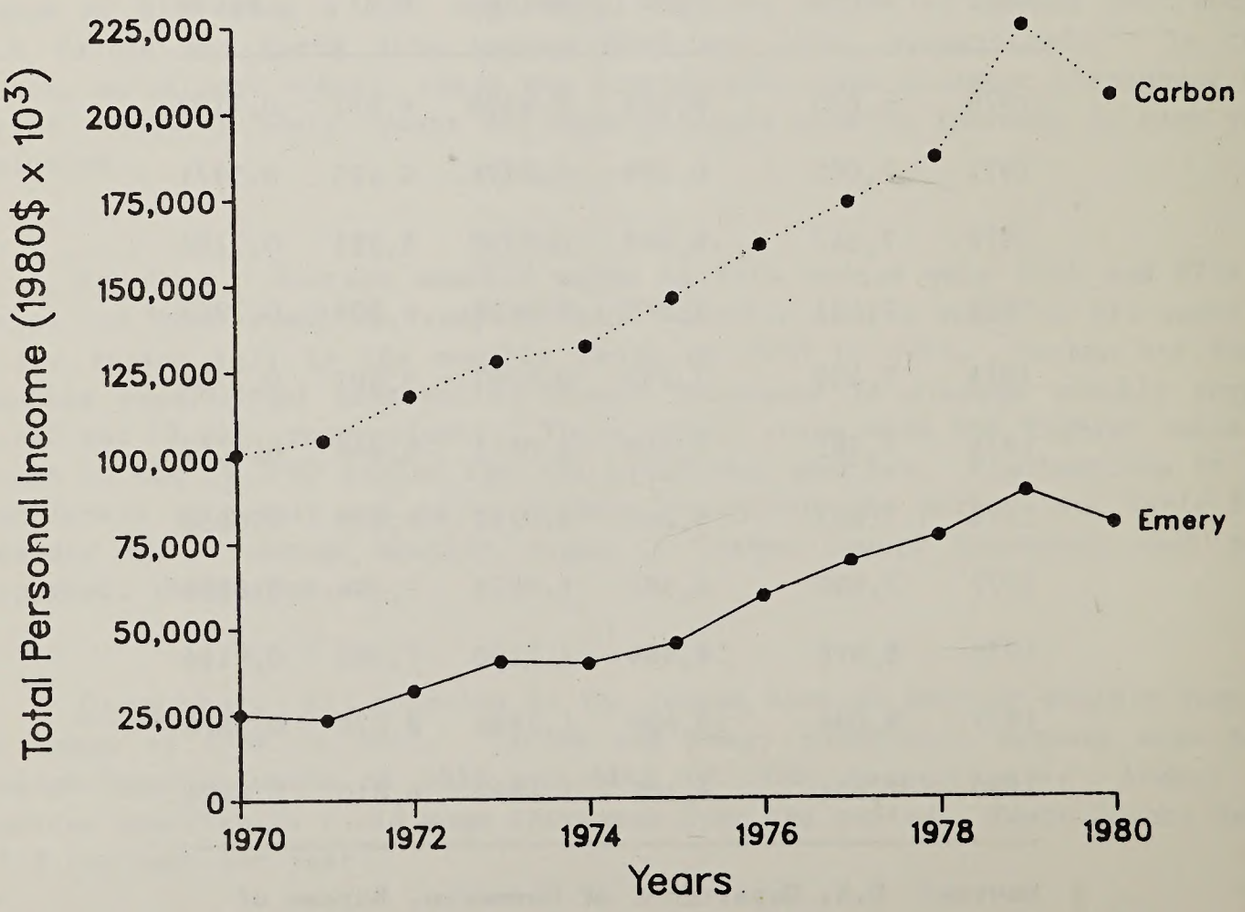

Fig. 2.8 Total Personal Income by County, 1970-1980

Total personal income in the county increased 102% from 1970 to 1980. The greatest increase was seen from 1978 to 1979 when it increased by 20%. During this same period (1978-1979), state personal income increased only 4.1%.

Emery County. Emery County experienced a 40% increase in per capita personal income between 1970 to 1980. The 1980 PCPI figure was lower by 16% than the 1979 level. Only once during the 10-year period did PCPI reach $8,000: in 1979, when the PCPI was $8,078. In 1971, PCPI in Emery County was $4,183, the lowest income level recorded by any county. Emery County per capita personal income for 1980 ($6,810) was its lowest figure since 1976.

In 1980, the ratio of PCPI for Emery County to the whole state was 0.8924. The PCPI was 0.5971 in 1971, the lowest in the region and time period studied. The county-state ratio of PCPI never surpassed 1.0 for the period.

Personal income in Emery County increased a significant 218% between 1970 and 1980. This was nearly four times the state-wide increase of 55%. Although its total level of personal income was lower in 1970, Emery surpassed Grand County in total personal income by 1977. This was due in part to a 36% increase from 1971 to 1972.

Baseline Personal Income Projections

The relationship of per capita personal incomes between the state and the counties, discussed above, was used in making the baseline personal income projections for each county. The relationship of county per capita income to the average state per capita income is provided in Table 2.10. The baseline per capita personal income projections for the state are assumed to grow at an annual rate of 1.7%*; by the year 2000, the state per capita income would be $11,568.

Carbon County achieved higher average per capita income levels relative to the state than did the other six counties in the last half of the 1970s. It is assumed that this phenomenon would be reversed during the next two decades and that by the year 2000, Carbon County per capita personal income would equal that of the state. Per capita personal income in Emery County was presumed to stabilize at 100% of the state value for the entire projection period (1985-2005).

Total personal income by county is presented in Table 2.11. This value is derived by multiplying the county-specific per capita income projections by the baseline population projections for each year. The total personal income projections by county are graphically illustrated in Fig. 2.9.

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*See Sec. 1 or Appendix A for a discussion of the methodology and assumptions.

Table 2.11 Baseline Personal Income Projections by County, 1985-2005 (1980 $)

Geographic Area and Income Category	Income Projections, by Year				
	1985	1990	1995	2000	2005
State of Utah					
PCPI[a] ($)	8,932	9,736	10,631	11,568	12,585
Carbon County					
PCPI[a] ($)	10,182	10,612	10,525	11,568	12,585
Total Personal Income (10^3)	301,389	366,114	384,163	426,859	469,421
Emery County					
PCPI[a] ($)	8,932	9,736	10,631	11,568	12,585
Total Personal Income (10^3)	125,941	144,093	160,528	170,050	183,741

[a]Per capita personal income.

Source: adapted from UPED model output, Utah Office of the State Planning Coordinator (June 1983).

Between 1985 and 2005, it is projected that Emery County would experience a 40.9% increase in per capita personal income. The PCPI for the state would also increase by 40.9% over this period. The 40.9% increase in both cases is a result of the assumed annual growth rate (1.7%). Per capita personal income in Carbon County would increase by 23.6% from 1985 to 2005.

Both counties would experience a substantial increase in total personal income. Carbon County would still have the greatest total personal income in 2005: $469 million. In 2005, total personal income would be almost $300 million greater in Carbon County than in Emery County. This would be a 155% difference.

Although total personal income is projected to increase in both counties in the period from 1985 to 2005, the growth in personal income is not forecast to be as large as the increases recorded for this region in the 1970s.

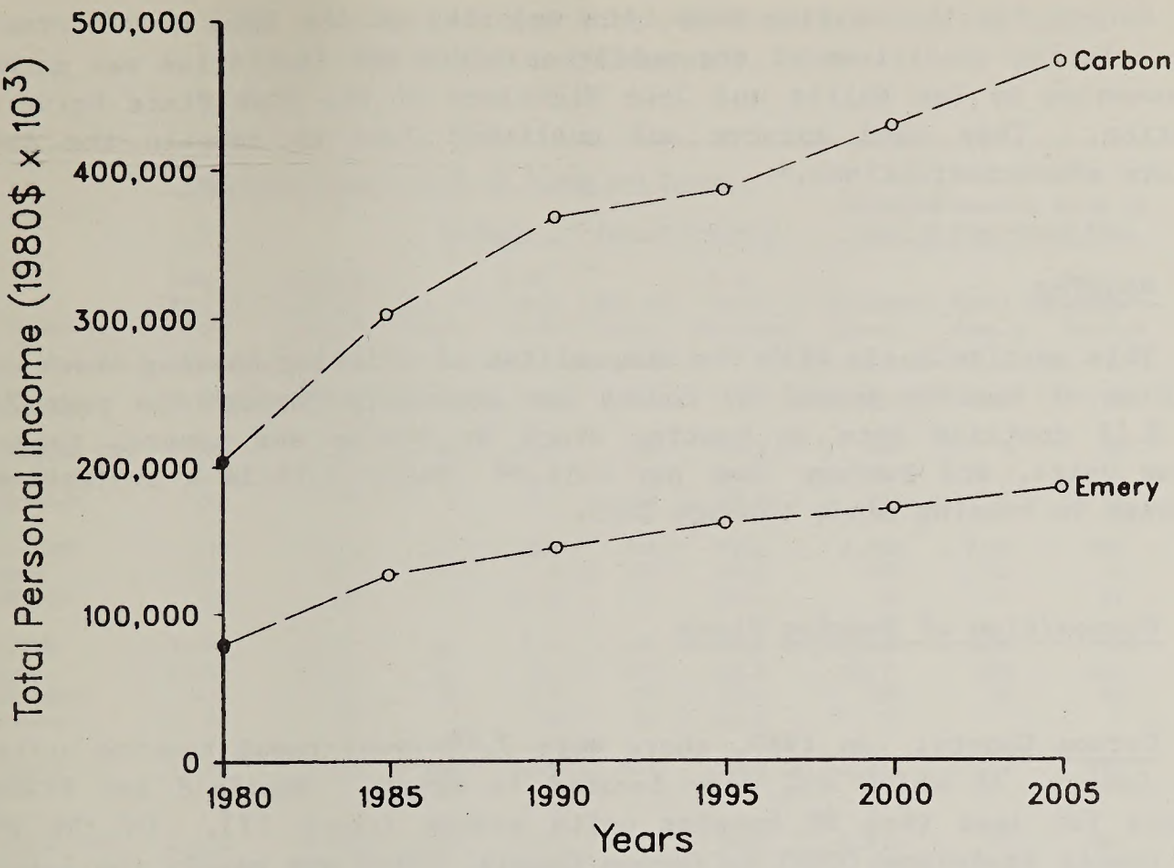

Fig. 2.9 Baseline Projection of Total Personal Income by County, 1985-2005

2.4 PUBLIC AND PRIVATE INFRASTRUCTURE

In addition to the baseline population and employment growth projected to occur in Carbon and Emery counties, there would also be some coinciding infrastructure effects. In this section, the public and private infrastructure requirements needed to satisfy the baseline population growth increment (i.e., baseline population projection by year minus 1980 population) are addressed. Aspects of county and community infrastructure considered (by subsection) are housing (2.4.1), education (2.4.2), health care services (2.4.3), public safety (2.4.4), utilities (2.4.5), and other services (2.4.6).

In each subsection the following areas are addressed; existing stock and condition of the service or facility, and the projected demand for additional infrastructure as a result of the forecasted growth in population. The demand projections are computed by using the *Community Facility Guidelines* of the State of Utah. These guidelines indicate standards that are to be used, for the different types of services and facilities, to determine the infrastructure impacts of future population growth. No attempt is made herein to determine the present infrastructure requirements or to assess the adequacy of the current provision of services.

Except for the housing data, the majority of the data and information on the existing conditions of the public services and facilities was gathered and assembled by Lee Nellis and John Nicholson of the Utah State University Foundation. They used surveys and published data to compile the infrastructure characterizations.*

2.4.1 Housing

This section deals with the composition of existing housing stock and a projection of housing demand by county and community through the year 2005. Table 2.12 contains data on housing stock by status and tenure, types of dwelling units, and average cost per unit.** Table 2.13 is a projection of the change in housing needs through 2005.

Composition of Housing Stock

Carbon County. In 1980, there were 7,794 year-round housing units in Carbon County, of which 41% were located in Price. Scofield and Hiawatha accounted for less than 90 housing units apiece (about 1%). Of the three Census County Divisions (CCD) in Carbon County, Price was easily the largest, containing 5,082 units. Of these, 3,195 were located in the city of Price, 433 in Wellington, and 89 in Hiawatha. The Helper CCD had 1,792 units, with 1,074 units in the city of Helper and 59 in Scofield. East Carbon CCD had 920 units in 1980: 714 in the city of East Carbon and 206 in Sunnyside.

The county as a whole had a vacancy rate of 7.1% in 1980. Sunnyside experienced the least vacancies -- only 3.4% -- and Scofield had far and away the most -- 42.4%. All other communities were within a 2% range of the countywide norm. Of these vacancies, approximately 35% were being held for rent and 18% were held for sale. Only 43 units were vacant on a seasonal basis. Of these, more than 60% were in Scofield, with no other community accounting for as much as 20%.

Nearly 68% of the occupied year-round units in the county were conventional housing units. Price accounted for 40% of these units, and Scofield accounted for only 0.4% (21 units). More than 90% of the housing units in both Hiawatha and East Carbon were conventional units. Multifamily

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*Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

**The housing data not presented in the table but included in the descriptive analysis for each county were extracted from Summary Tape File 3A, 1980 Census of Population and Housing, U.S. Department of Commerce (1982).

Table 2.12 Composition and Stock of Existing Housing Units by County and Community, 1980

County/Community	Year-Round Housing Stock by Status and Tenure: Total (No. of units)	Occupied (No. of units)	Vacancy: No. of Units	Vacancy: % of Total Stock	Renter-Occupied: No. of Units	Renter-Occupied: % of Total Occupied	Occupied Housing Stock by Type of Year-Round Unit: Conventional	Multifamily	Mobile Home/ Trailer	Average Cost per Unit[a]
Carbon County	7,794	7,242	552	7.1	1,711	23.6	5,289	990	963	49,042
East Carbon CCD	920	874	46	5.0	129	14.8	767	9	98	[b]
East Carbon	714	675	39	5.5	102	15.1	620	9	46	29,138
Sunnyside	206	199	7	3.4	27	13.6	147	0	52	24,720
Helper CCD	1,792	1,643	149	8.3	364	22.2	1,180	172	291	[b]
Helper	1,074	993	81	7.5	250	25.2	837	126	30	44,437
Scofield	59	34	25	42.4	5	14.7	21	0	13	31,953
Price CCD	5,082	4,725	357	7.0	1,218	25.8	3,342	809	574	[b]
Price	3,195	2,967	228	7.1	872	29.4	2,114	693	160	57,107
Wellington	433	396	37	8.5	78	19.7	280	29	87	46,643
Hiawatha	89	82	7	7.9	82	100.0	75	7	0	[b]
Emery County	3,660	3,276	384	10.5	672	20.5	2,118	164	994	50,238
Castle Dale-Huntington CCD	2,436	2,200	236	9.7	421	19.1	1,423	91	686	[b]
Castle Dale	622	542	80	12.9	124	22.9	333	24	185	53,669
Cleveland	156	147	9	5.8	15	10.2	110	0	37	41,775
Elmo	90	82	8	8.9	7	8.5	63	4	15	48,577
Huntington	757	698	59	7.8	158	22.6	353	43	302	51,420
Orangeville	397	367	30	7.6	63	17.2	297	9	61	53,917
Emery-Ferron CCD	799	712	87	10.9	150	21.1	488	55	169	[b]
Emery	144	114	30	20.8	18	15.8	108	0	6	34,634
Ferron	538	489	49	9.1	115	23.5	293	52	144	58,242
Green River CCD	425	364	61	14.4	101	27.7	207	18	139	[b]
Green River	388	335	53	13.7	96	28.7	191	18	126	39,350

[a]Mean value of owner-occupied noncondominium housing units.

[b]Not available.

Source: adapted from U.S. Department of Commerce, *1980 Census of Population and Housing*, Summary Tape File 3A (1982).

Table 2.13 Change in Housing Demand by County and Community Resulting from the Baseline Household Projections[a,b,c] (1985-2005)

County/Community	Change in Housing Demand, by Year and Type (Number of Units)															Percent Change 1985-2005		
	1985			1990			1995			2000			2005					
	Single Family	Multi-Family	Mobile Homes	Single Family	Multi-Family	Mobile Homes	Single Family	Multi-Family	Mobile Homes	Single Family	Multi-Family	Mobile Homes	Single Family	Multi-Family	Mobile Homes	Single Family	Multi-Family	Mobile Homes
Carbon County	1,290	323	538	2,126	532	886	2,396	599	998	2,528	632	1,053	2,636	659	1,098	104.3	104.0	104.1
East Carbon CCD	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	NA	NA	NA
East Carbon	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	NA	NA	NA
Sunnyside	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	NA	NA	NA
Helper CCD	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	NA	NA	NA
Helper	86	22	36	153	38	64	165	42	69	175	44	73	189	48	79	119.2	118.2	119.4
Scofield	3	1	2	6	2	3	7	2	3	8	2	3	8	2	4	166.7	100.0	100.0
Price CCD	1,096	274	457	1,915	479	1,048	2,179	545	908	2,321	581	967	2,418	605	1,008	120.6	120.8	120.6
Hiawatha	d	d	d	4	1	2	2	1	1	3	1	1	3	1	2	e	e	e
Price	745	187	311	1,272	318	530	1,477	370	616	1,610	403	671	1,671	418	697	124.3	123.5	124.1
Wellington	162	41	68	243	61	102	270	68	113	284	71	118	293	74	122	80.9	80.5	79.4
Emery County	382	96	159	448	112	187	472	118	197	448	112	187	412	103	172	7.9	7.3	8.2
Castle Dale-Huntington CCD	144	36	60	227	57	95	237	60	99	206	52	86	191	48	80	32.6	33.3	33.3
Castle Dale	114	29	48	149	37	62	160	40	67	151	38	63	147	37	61	28.9	27.6	27.1
Cleveland	6	2	3	11	3	5	11	3	5	9	3	4	9	3	4	50.0	50.0	33.3
Elmo	6	2	3	9	3	4	9	3	4	8	2	4	8	2	3	33.3	0	0
Huntington	48	12	20	60	15	25	55	14	23	46	12	19	42	11	18	-12.5	-8.3	-10.0
Orangeville	88	22	37	104	26	43	106	27	44	100	25	42	97	25	41	10.2	13.6	10.8
Emery-Ferron CCD	76	19	32	45	12	19	50	13	21	42	11	18	38	10	16	-50.0	-47.4	-50.0
Emery	9	3	4	5	2	2	6	2	3	6	2	3	5	2	2	-44.4	-33.3	-50.0
Ferron	87	22	37	68	17	29	73	19	31	70	18	29	67	17	28	-23.0	-22.7	-24.3
Green River CCD	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	NA	NA	NA
Green River	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	NA	NA	NA

[a]It is assumed that each household requires a housing unit, thereby resulting in a one-to-one correspondence between the household projections generated by UPED and housing demand.

[b]Totals may not add due to rounding.

[c]Census County Division (CCD).

[d]Population projections indicate a decline in future population levels. Consequently, existing housing units should become available in future time periods. The following 1980 to 2005 availability is expected: East Carbon CCD - 268 to 520; East Carbon - 127 to 377; Sunnyside - 27 to 87; Helper CCD - 291 to 2; Hiawatha - 2 in 1985; Green River CCD - 158 to 110; and Green River - 158 to 117.

[e]Undefined.

units comprised almost 14% of the housing units within the county that were occupied. Price accounted for 70% of the total, whereas none of the 199 occupied units in Sunnyside were multifamily units. Mobile homes and trailers also accounted for more than 13% of the occupied housing units. The greatest concentration was found in Scofield, where more than 38% of the housing units were mobile homes or trailers. None of the 82 units in Hiawatha was a mobile home or a trailer.

Countywide, 23.6% of the occupied units were occupied by renters. In Hiawatha, all 82 units were rented. In Sunnyside, Scofield, and East Carbon, less than one-sixth of the units were rented. Of these rented units, 47% were single family units. Only in Price is there a greater percentage of multi-family rental units than single family rented units.

Of the occupied units existing in 1980, more than 56% had been constructed before 1950. In East Carbon and Hiawatha, more than 90% of the occupied units were constructed before 1950. In Price and Wellington, almost 5% of the occupied units were constructed between 1979 and March 1980.

The average cost per unit countywide is $49,042. This value ranges considerably by community, with Sunnyside ($24,720) and East Carbon ($29,138) on the low end and Price ($57,107) on the high.

Finally, 48% of the homeowners countywide moved into their present home since 1975. In Hiawatha this figure was 84%. In Price, Helper, and East Carbon, more than 20% of the homeowners moved into their present home before 1960.

Emery County. A total of 3,660 housing units existed in Emery County in 1980. No one community accounted for more than 21% of the housing units; Huntington had the most with 757. Elmo, with 90, contributed the least to the county total. The Castle Dale-Huntington CCD was clearly the area with the largest number of housing units; with 2,436 units, it had three times more than any other CCD in Emery County. Huntington, with 757 units, and Castle Dale, with 622 units, were the largest communities in the CCD. The Emery-Ferron CCD contained 799 units in 1980 -- 538 in Ferron and 144 in Emery. Green River was the smallest CCD in the county, with 425 units. Of these, 388 were located in the city of Green River.

The county vacancy rate was 10.5%. Emery at 20.8% and Castle Dale at 12.9% were the only two communities above the norm. Almost 34% of the vacant units were being held for rent, and 17% were being held for sale. Only 22 units in the county were vacant on a seasonal basis. Of these, 16 were located in Huntington.

Of the 3,276 occupied units in the county, 65% were conventional housing units. In the city of Emery, 95% of the units were conventional housing units, compared to only 51% in Huntington. Multifamily units

comprised only 5% of all housing units. Cleveland and Emery each had zero; Elmo and Orangeville also had fewer than 10 apiece. The greatest concentration was in Ferron, where multifamily units accounted for nearly 11% of the occupied units. More than 30% of the occupied units in the county were mobile homes or trailers. Concentrations of these units ranged from 5% in Emery to more than 43% in Huntington.

More than 20% of the occupied housing units were occupied by renters. Elmo had only 8.5% renters and Cleveland only 10.2% renters. All other communities in the county had more than 15%. Of the rented units, 44% were single family dwellings. Only 11% were for three or more families.

Of the occupied units existing in 1980, more than 54% had been built since 1970. Also, 23% had been built before 1940.

The average cost per unit countywide in 1980 was $50,238. Ferron, at $58,242, had the highest average while Emery was markedly below the norm, at $34,634.

More than 64% of the homeowners had moved into their current unit since 1975. This is a dramatic change for only a five-year period. This figure was 73% in both Ferron and Castle Dale. In the city of Emery, however, more than 31% of the homeowners had been in the same unit since 1949 or before. Emery was also the only community studied where more than half of the homeowners had lived in the same unit since before 1970.

Baseline Projections of Housing Demand

The baseline projections for housing by county and community between 1985 and 2005 presented in Table 2.13 represent the change in expected housing demand for the two counties due to baseline population and household growth during this 20-year period.

Table 2.13 indicates that there would be a dramatic increase in housing demand between 1985 and 2005. Carbon County is projected to experience a substantial increase, with housing demand in 2005 anticipated to be 104% greater than in 1985. Emery County is expected to realize a much lower increase in additional housing demands, with an increase of 10.1% between 1985 and 2005. Both counties, however, would have a need for more housing in 2005 than in 1985.

At the same time, some communities are projected to realize a decreased housing demand over the period. Four communities or CCDs studied in Emery County would have such a decline: Emery-Ferron CCD (-50%), Emery (-44%), Ferron (-23%), and Huntington (-13%). The two-county area also contains seven communities or CCDs which, due to decreasing populations, are expected to have an excess in housing stock throughout the period studied. These communities are identified in footnote d of Table 2.13. It is interesting to note that,

although excess housing in the Helper CCD is forecast throughout the period, both of the communities analyzed in this CCD -- Helper and Scofield -- are expected to have a great increase in housing demand over the period studied.

Several communities and CCDs are projected to have dramatic increases in housing demand over this period. Most notably, demand would increase by 124% in the city of Price and by 120% in the city of Helper.

Throughout the counties, housing demand is forecast to increase more rapidly between 1985 and 1995 than between 1995 and 2005. Demand in Carbon County would increase at an annual rate of 6.36%. In the period from 1995 to 2005, Carbon County is expected to maintain its demand for additional housing, but at a much slower rate, 0.98% annually. Emery is projected to have a 1.22% annual decline in demand over this 10-year period.

Like the countywide trend, most communities are projected to have greater increases in housing demand in the period from 1985 to 1995 than in that from 1995 to 2005. The most notable yearly increases are expected in Price (7.09% annually) and Helper (6.76% annually). Other communities would experience greater rates of increased demand, but their low volume does not warrant mention. Only two communities are expected to have a decrease in baseline demand over this period: Emery (-3.97% annually) and Ferron (-1.79% annually).

In the period from 1995 to 2005, most areas are projected to have a reduction in baseline demand compared to the earlier period. Those communities still projected to increase their housing demands do so at a much reduced rate. Annual baseline demand in Price drops from 7.09% to 1.24% between 1995 and 2005; in Helper it drops from 6.76% to 1.34%.

It is projected that both counties require new housing construction, when 1985 housing demand is compared to present housing stock. This demand would be 26% greater in Carbon County and 17% greater in Emery County.

2.4.2 Education

This section describes the current enrollment and staffing conditions in each county school district, and the expected demand for additional teachers and school facilities due to the baseline population projections identified in Sec. 2.2.2. The enrollment, school capacity, percent of capacity currently being used, number of teachers, and student/teacher ratio are presented in Table 2.14 for each school and for each of the two counties as a whole. Each school district is further described below. A description of the fiscal conditions of each school district is presented in Sec. 2.5.

Table 2.14 Current Enrollment, Capacity, and Staffing Statistics by County, 1982

District/School	Location	Enrollment	Present Capacity	Percent of Capacity	Teachers	Student/ Teacher Ratio
Carbon County School District		5,245	5,549	94.5	217	24:1
Castle Heights Elementary	Price	595	559	106.4	19	31:1
Durrant Elementary	Price	507	592	85.6	18	28:1
Price Elementary	Price	549	817	67.2	21	26:1
Reeves Elementary	Price	324	236	137.3	14	23:1
Mont Harmon Junior High	Price	712	764	93.2	30	24:1
Carbon High School	Price	787	716	109.9	38	21:1
Sally Manto Elementary	Helper	500	464	107.8	19	26:1
Helper Junior High	Helper	270	339	79.6	14	19:1
Petersen Elementary	Sunnyside	352	394	89.3	15	23:1
East Carbon High School	Sunnyside	222	343	64.7	16	14:1
Wellington Elementary	Wellington	427	325	131.4	13	33:1
Emery County School District		3,281	4,347	75.5	147	22:1
Castle Dale Elementary	Castle Dale	442	492	89.8	18	25:1
Emery County High School	Castle Dale	476	1,012	47.0	26	18:1
Cleveland Elementary	Cleveland	327	366	89.3	12	27:1
Ferron Elementary	Ferron	556	494	112.6	18	31:1
San Rafael Junior High	Ferron	350	403	86.8	16	22:1
Book Cliff Elementary	Green River	161	161	100.0	8	20:1
Green River High School	Green River	134	342	39.2	11	12:1
Huntington Elementary	Huntington	548	674	81.3	21	26:1
Canyon View Junior High	Huntington	287	403	71.2	17	17:1

Source: tabulated from Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

Existing Conditions in the County School Districts

Carbon County School District. In 1982, 5,245 students were enrolled in the 11 schools in Carbon County. Carbon High School in Price had the largest enrollment, with 787 students; Helper Junior High School in Helper had the smallest enrollment, with 270. The six schools in Price accounted for more than 65% of the total enrollment in the school district.

The total 1982 capacity of the schools in the county was 5,549. With one exception, the schools in Price had a larger capacity than those of the other schools in the district. Price Elementary School and Reeves Elementary School, both in Price, had the largest and smallest capacities in the county, respectively.

The 11 schools in the district had an average operating capacity of almost 95% in 1982. Five schools -- led by Reeves Elementary School at 137% -- had enrollments greater than their stated capacity. To accommodate this condition, the district makes extensive use of portable classrooms.

Carbon County employed 217 teachers in 1982; this translates into a 24:1 student/teacher ratio. East Carbon High School in Carbon had the lowest

ratio (14:1), while Wellington Elementary School in Wellington had the highest ratio (33:1). The district student/teacher ratio of 24:1 is slightly greater than the state average of 23:1.

Carbon County approved a $16 million bond for school construction and improvements in 1982. The state estimates that the county would need to invest more than $10 million in schools by 1987, but Utah does not indicate how much of that would be needed through 1995. The 1982 bond issue exhausted the legal debt capacity of the school district.

Emery County School District. Enrollment in Emery County schools totaled 3,281 in 1982. Ferron Elementary School in Ferron had the largest enrollment (556), while Green River High School in Green River had the smallest enrollment (134). Castle Dale, Ferron, and Huntington, each of which have two schools, had about 80% of the total enrollment in the district.

The nine schools in the district had a combined capacity of 4,347 students. The capacities of the schools ranged from 161 at Book Cliff Elementary to 1,012 at Emery County High School in Castle Dale.

Only one school in the district -- Ferron Elementary School -- had an enrollment that exceeded its capacity in 1982. The schools throughout the district were operating at slightly more than 75% of capacity. Some portable classrooms are used, but most of the schools could accommodate another 100 students.

The district employed 147 teachers in 1982. The student/teacher ratio for the district was 22:1, just below the state ratio (23:1). Ferron Elementary had a student/teacher ratio of 31:1, the highest in the district, while Green River High School had the lowest ratio, 12:1.

The county recently completed a building program that doubled the capacity of the schools. More than $30 million in bonding capacity remains; the state estimates the district would need to spend more than $18 million by 1987 to accommodate expected growth. Based on the 1980 age distribution, the school-age population would increase rapidly in coming years.

Baseline Projection of Educational Services

The baseline projections for additional educational services by county between 1985 and 2005 are presented in Table 2.15. The projected number of students was computed by the UPED model based on changes in the general population between 1985 and 2005. The numbers of teachers and classrooms were subsequently derived from the projected number of students.*

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*See Sec. 1 and Appendix A for a discussion of the methodology.

Table 2.15 indicates that the demand for additional educational services is projected to increase substantially between 1985 and 2005. Carbon County is expected to expand by 146% in the number of students and corresponding numbers of teachers and classrooms. Emery County is forecast to have 86% more students in 2005 than the number of additional students expected to be in the county in 1985.

In each of the counties, the demand for additional educational services is projected to grow more rapidly between 1985 and 1995 than between 1995 and 2005. Growth from 8 to 10% annually would occur in Carbon and Emery counties between 1985 and 1995, but in the following 10-year period each of these counties is expected to experience a slight decline in the demand for educational services.

It is projected that the number of students in 1985 would be 45% greater in Carbon County than the 1982 enrollment. By 2005, the number of students in each county would have increased by at least 50% compared to 1985 enrollment and as much as 100% compared to 1982 enrollment. Without an increase in the present capacity of the schools in each county, Carbon County would be operating at 187% of capacity in 2005.

2.4.3 Health Care Services

A description of general health care and mental health care services is presented in this section. Both the existing health care services and the

Table 2.15 Additional Educational Service Demands by County and Year, Resulting from the Baseline Population Projections[a]

County/ Service Demand	Additional Service Demands, by Year[b]					Average Annual Compound Percent Change		Percent Change
	1985	1990	1995	2000	2005	1985-1995	1995-2005	1985-2005
Carbon County								
Students	1,924	3,824	4,824	4,624	4,724	9.63	-0.21	145.5
Classrooms	77	153	193	185	189	9.62	-0.21	145.5
Teachers	77	153	193	185	189	9.62	-0.21	145.5
Emery County								
Students	816	1,416	1,716	1,516	1,516	7.72	-1.23	85.8
Classrooms	33	57	69	61	61	7.65	-1.22	84.8
Teachers	33	57	69	61	61	7.65	-1.22	84.8

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah, and the UPED model output, Utah Office of the State Planning Coordinator (June 1983). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

projected demand for health care services in each county are addressed. Emergency medical services is considered separately in Sec. 2.4.4.

Existing General Health Care Conditions in the Counties

Carbon County. It has been determined elsewhere that, in general, health care services in Carbon County are at or above recommended service levels. Castleview Hospital in Price currently has 70 beds; an expansion to 88 beds is planned for completion in December 1983. This hospital also serves Emery County, where there is no hospital.

There are 21 physicians, with a wide range of medical specialities, in the county. Eighteen of the physicians are located in Price, two are in Helper, and one is in East Carbon. The county is also served by 11 dentists in Price and one dentist in Helper.

Emery County. Since there is no hospital in Emery County, hospital services are provided by Castleview Hospital in Price (Carbon County) and by the Allen Memorial Hospital in Moab (Grand County). Green River has a clinic staffed by a nurse-practitioner, and Castle Dale has a clinic and two physicians. There are two dentists in Castle Dale, one dentist in Ferron, and a dentist visits Green River once a week.

Existing Mental Health Care Conditions in Counties

Carbon County. A recent study by John Short and Associates* concluded that mental health services in Carbon County could be deemed adequate. At the same time, an interview with a representative of the state Mental Health Services indicated that the existing mental health center is understaffed and has faced rising admissions and a declining staff since 1978.

Emery County. Mental health services in Emery County are provided by the state Mental Health Services office in Price, Carbon County. The state also maintains a permanent office in Castle Dale. A heavy case load increase has been handled by a staff that has declined by 30%, since 1978, due to insufficient funding.

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*John Short and Associates, *Sage Point/Dugout Canyon Project: Infrastructure and Community Plan*, p. 125 (Jan. 1983), as cited in Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

Baseline Projection of Health Care Services

Table 2.16 illustrates the change in the demand for health care services resulting from the baseline population projections. The number of additional hospital beds, doctors, dentists, nurses, public health nurses, clinical psychologists, and mental health workers that would be needed in each county between 1985 and 2005 is projected. The largest increases during the time period would occur in Carbon County; in most cases the number of medical personnel and hospital beds would double. A smaller increase is expected to occur in Emery County. At no time in any county would more than two additional clinical psychologists or mental health care workers be required.

Table 2.16 Change in Health Care Services by County and Year Resulting from Baseline Population Projections[a]

	Change in Health Care Demand, by Year					Average Annual Compound Percent Change	
County/Service Demand	1985	1990	1995	2000	2005	1985-1995	1995-2005
Carbon County							
General Health Care							
Hospital beds							
General care	15	25	29	30	31	6.81	0.67
Long-term care	23	39	39	39	43	5.42	0.98
Medical personnel							
Doctors	5	8	9	9	10	6.05	1.06
Dentists	4	7	8	8	8	7.18	0
Nurses	13	21	25	25	26	6.76	0.39
Public health nurses	2	3	3	3	4	4.14	2.92
Mental Health Care							
Clinical psychologists	1	1	1	1	1	0	0
Mental health workers	1	2	2	2	2	7.18	0
Emery County							
General Health Care							
Hospital beds							
General care	6	7	8	7	7	2.92	-1.33
Long-term care	6	6	6	4	4	0	3.97
Medical personnel							
Doctors	2	3	3	2	2	4.14	-3.97
Dentists	2	2	2	2	2	0	0
Nurses	5	6	7	6	6	3.42	0
Public health nurses	1	1	1	1	1	0	0
Mental Health Care							
Clinical psychologists	1	1	1	1	1	0	0
Mental health workers	1	1	1	1	1	0	0

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and UPED model output, Utah Office of the State Planning Coordinator (June 1983). See Appendix A for service standard guidelines.

Since there are no hospitals in Emery County, even the modest increases in the demand for hospital beds would tax existing resources. The additional demand for doctors would be equal to, or only slightly less than, the present number of doctors in Emery County.

2.4.4 Public Safety

The resources of Carbon and Emery counties and their cities for law enforcement, fire protection, and emergency medical services are described below. Both the existing level of service and facilities and the baseline projections of public safety requirements are presented.

Law Enforcement

Carbon County. The Carbon County Sheriff's Department serves the unincorporated areas of the county. The 12 officers of the Department also provide backup and dispatching for the police forces of the cities in the county, with the exception of East Carbon, which has its own dispatch service. The only jail in the county is the county jail in Price. The jail has been described as "essentially overcrowded" and not meeting most state and federal standards. An assessment of this situation has determined that "the potential for lawsuits concerning jail standards does exist."*

In addition to the county resources, several of the cities in the county employ law enforcement personnel. Wellington has one full-time police officer, Price has 17, Helper has five, and East Carbon and Sunnyside share one officer.

Emery County. The Emery County Sheriff's Department serves all areas of the county except for the city of Green River. The Department has 34 full-time officers, dispatchers, and jailers. According to the sheriff, any significant increase in population would necessitate an increase in this force. The Emery County jail in Castle Dale currently accommodates an average of 10 prisoners. The principal problem of the facility is the detention of women and juveniles -- one female or juvenile prisoner uses the same amount of space as 12 men.

Green River maintains its own two-officer police force. Five Utah Highway Patrol officers and two deputy sheriffs are also stationed in Green River.

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*John Short and Associates, *Sage Point/Dugout Canyon Project: Infrastructure and Community Plan*, p. 95 (Jan. 1983), as cited in Nellis, Lee and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

Fire Protection

Carbon County. Carbon County helps fund the fire departments in the cities within the county, and all fire calls are dispatched through the county sheriff's department. Otherwise, fire protection is provided by the local communities. East Carbon has a 12-member volunteer fire protection force and two pumpers and one tanker with a combined 1500-gallon capacity. Helper has a 16-member volunteer force and two pumpers, a tanker, and a pumper/rescue truck with a combined capacity of 2,500 gallons. The Price Fire Department has a full-time chief, 25 volunteers, and three pumpers, a pumper/ladder truck, and a tanker with a combined capacity of 4,500 gallons. Sunnyside has a 16-member volunteer force and two pumpers with a combined capacity of 4,000 gallons. Wellington has a 20-member volunteer force and two pumpers and a tanker with a combined capacity of 2,150 gallons.

Emery County. Emery County is the principal funding agency for the volunteer fire departments located throughout the county. The county recently constructed a new fire station in each Castle Valley community and provided new mini-pumper trucks for each department. The county also covered 75% of the cost of a tanker for each department.

Emergency Medical Services

Carbon County. Carbon County provides ambulance service for all parts of the county. All ambulance calls are dispatched through the sheriff's department. The county has 19 active emergency medical technicians and five ambulances located in Price, and eight emergency medical technicians and two ambulances located in Sunnyside.

Emery County. Paid volunteer emergency medical technicians staff four ambulances provided by Emery County in Emery, Ferron, Castle Dale, and Huntington. There are three ambulances in Green River, also staffed by volunteer emergency medical technicians.

Baseline Projection of Public Safety Requirements

Table 2.17 illustrates the change in the demand for public safety services resulting from the baseline population projections. For law enforcement, the number of additional police officers, patrol cars, juvenile holding cells, and the amount of jail space that would be needed in each county between 1985 and 2005 is projected. Similar projections are made for fire protection measured by fire hydrant flow and duration. For emergency

Table 2.17 Change in Public Safety Requirements by County and Year as a Result of the Baseline Population Projections[a]

County/Service Demand	Additional Service Demands, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Carbon County							
Law Enforcement							
Police officers	15	25	29	30	31	6.81	0.67
Patrol cars	15	25	29	30	31	6.81	0.67
Jail space (sq ft)	3,703	6,161	7,161	7,306	7,551	6.82	0.53
Juvenile holding cells[b]	1	2	2	2	3	7.18	4.14
Fire Protection							
Fire hydrant flow (gpm)/ duration (hr)[c]	3,000/10	3,000/10	3,000/10	3,000/10	3,000/10	0	0
Emergency Medical Service							
Ambulances	2	3	3	3	4	4.14	2.92
Emergency medical technicians	14	21	21	21	28	4.14	2.92
Emery County							
Law Enforcement							
Police officers	6	7	8	7	7	2.92	-1.33
Patrol cars	6	7	8	7	7	2.92	-1.33
Jail space (sq ft)	1,305	1,695	1,815	1,640	1,550	3.35	-1.57
Juvenile holding cells[b]	1	1	1	1	1	0	0
Fire Protection							
Fire hydrant flow (gpm)/ duration (hr)[c]	1,750/7	2,000/8	2,000/8	2,000/8	2,000/8	1.34	0
Emergency Medical Service							
Ambulances	1	1	1	1	1	0	0
Emergency medical technicians	7	7	7	7	7	0	0

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah, and UPED model output, Utah Office of the State Planning Coordinator (June 1983). See Appendix A for service standard guidelines.

[b]Number of 16-hour juvenile holding cells.

[c]Fire hydrant flow is measured in gallons per minute (gpm) for a length of time (duration) measured in hours.

medical services, the number of ambulances and emergency medical technicians is projected. In each instance, whenever the standard indicated that a fraction of a service would be needed, the number was rounded up to the next highest integer. For example, if the standard specified that the equivalent of half an ambulance is required by the projected population increase in a county, the county was said to have a service demand of one ambulance.

The additional demand for most services is forecast to be greater between 1985 and 1995 than between 1995 and 2005. The greatest increase in law enforcement services would occur in Carbon County, where the demand for

police officers and patrol cars would increase about 7% annually between 1985 and 1995. There are projected to be slight increases in the demand for fire protection services in Emery County, while the demand for fire protection services in Carbon County would remain constant. The demand for emergency medical services in Carbon County is expected to increase by 3-4% annually between 1985 and 2005, while this service is projected to remain unchanged in Emery County.

Considering the inadequate conditions currently existing in the Carbon County jails, the additional demand for jail space would be especially severe. The demand for police officers by 2005 would be more than twice as large as the existing police force in Carbon County and would be roughly equal to one-fifth of the existing force in Emery County. It is difficult to compare the existing fire protection services with the demand for fire protection services since the existing services are described in terms of fire hydrant flow and duration. The emergency medical services in both counties are expected to be adequate for the projected increase in population.

2.4.5 Utilities

The characteristics of the sewage, solid waste disposal, and water supply and treatment systems for the two counties are detailed below. The existing facilities and demands and the baseline projections for additional services are described. The projected service requirements for all three utilities are presented.

Sewage System

Table 2.18 presents a summary of the sewage system characteristics in the two counties. Almost all of the communities are served by a central sewage system. Frequently, a special district is responsible for sewage collection and treatment in a county. The most common type of collection is gravity flow. The type and capacity of treatment facilities vary from county to county.

Carbon County. The Price River Water Improvement District provides sewage treatment for the residents of Helper, Price, Wellington, and the more densely populated but unincorporated areas of Carbon County. The system "is operating at substantially higher levels than those for which it was designed."* A plan to increase the capabilities of the district recommends

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*John Short and Associates, *Sage Point/Dugout Canyon Project: Infrastructure and Community Plan*, p. 84 (Jan. 1983), as cited in Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

Table 2.18 Summary of Sewage Disposal System Characteristics by Area (1982)

County/Community	Central System	Collection Type	Number of Existing Connections	Sewage Treatment Plant: Design Flow Capacity (10^6 gal per day)	Sewage Treatment Plant: Average Daily Flow (10^6 gal per day)	Sewage Treatment Plant: System Type	Sewage Treatment Plant: Population Capacity	Sewage Treatment Plant: Expansion Plans
Carbon County								
East Carbon	Yes[a]	Gravity flow	963	0.5	0.5	Lagoons	4,000	Yes
Helper	Yes[b]	Gravity flow	6,200	1.9	2.6	Trickling filter	21,500	Yes
Price	Yes[b]	Gravity flow	-	-	-	-	-	-
Sunnyside	Yes[a]	Gravity flow	-	-	-	-	-	-
Wellington	Yes[b]	Gravity flow	-	-	-	-	-	-
Emery County								
Castle Dale	Yes[c,d]	Gravity flow	NA	NA	NA	Lagoon	7,000	No
Cleveland	Yes	Gravity flow	NA	NA	NA	Lagoon	1,400	
Elmo	Yes	Gravity flow	NA	NA	NA	Lagoon	700	
Emery	Yes[c]	Gravity flow	NA	NA	NA	Lagoon	1,300	
Ferron	Yes[c]	Gravity flow	NA	NA	NA	Lagoon	800	Yes
Green River	Yes	Gravity flow	NA	NA	0.15	Mechanical trickling filter		Yes
Huntington	Yes[c]	Gravity flow	NA	NA	NA	Lagoon	3,000	Yes
Orangeville	Yes[c,d]	Gravity flow	-	-	-	-	-	No

[a]Sunnyside and East Carbon share facilities. A description appears under East Carbon in the text.

[b]Helper, Price, and Wellington are served by the Price Water Improvement District. A description of the capacity of the district is included under Helper in the text of this report.

[c]Served by the Castle Valley Special Service District.

[d]Castle Dale and Orangeville share the same sewage disposal system. A description appears under Castle Dale.

Source: Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983), and Utah State Energy Office et al., *Final Socioeconomic Technical Report, Uintah Basin Synfuels Development* (Feb. 1983).

increasing treatment capacity to 3.9 million gallons per day, sufficient for a population of 31,500 -- or about 10,000 more people than the system presently serves.

East Carbon and Sunnyside share a sewage treatment system that consists of gravity collection mains and lagoons. The treatment facility is designed for expansion from the current three to eight lagoons and could serve a population of 4,000.

Emery County. The Castle Valley Special Service District has incorporated the water, sewer, drainage, and road needs of Castle Valley communities into a taxing district that includes both the communities and nearby power plants. The improvement program for the district is designed to support an increase of at least 132% in the Castle Valley population over the next 40 years. The district operates the sewage systems in Castle Dale, Emery, Ferron, Huntington, and Orangeville. The systems in Ferron and Huntington are at or near capacity.

Cleveland has a new central sewage system capable of serving a population of 1,400. Elmo completed a central sewage system, in 1982, capable of serving a population of 700. Green River has a mechanical trickling filter sewage treatment plant that does not operate correctly, and the city is actively pursuing funding for a new lagoon treatment facility.

Solid-Waste Disposal System

As seen in Table 2.19, the solid-waste disposal system in Carbon and Emery counties is highly decentralized. Solid-waste collection is principally done by private contractor in the communities. In most cases, landfills are operated by the county, although several cities have their own landfills.

There is room for substantial expansion at the landfill in East Carbon. Both the Emery County landfill near Castle Dale and the city-operated landfill in Green River have an undetermined capacity.

In general, solid-waste disposal is a potentially limiting factor for all counties affected by tar sand developments. State health standards requiring "daily covering" of waste material involve both labor and equipment costs. Counties and municipalities throughout the state, but particularly in rural areas, have been unable or unwilling to comply with state standards regarding solid-waste disposal.

Water System

A summary of the characteristics of the water systems in Carbon and Emery counties is presented in Table 2.20. The numerous water districts and

Table 2.19 Summary of Solid-Waste Disposal System by Area (1982)

County/Community	Collection Method	Landfill System
Carbon County		
East Carbon	Private contractor	Shared with Sunnyside
Helper	Private contractor	Operated by county
Price	Private contractor	Operated by county
Sunnyside	Private contractor	Shared with East Carbon
Wellington	Private contractor	Operated by county
Emery County		
Castle Dale	Private contractor	Operated by county
Cleveland	Private contractor	Operated by county
Elmo	Private contractor	Operated by county
Emery	Private contractor	Operated by county
Ferron	Private contractor	Operated by county
Green River	Private contractor	Operated by city
Huntington	Private contractor	Operated by county
Orangeville	Private contractor	Operated by county

Source: adapted from Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

communities draw on rivers, springs, reservoirs, and wells as sources for their culinary water. Several areas are approaching or exceeding their available water supply. Problems with existing facilities are also present. Efforts to expand and improve the water system are underway throughout the region.

Carbon County. The Price River Water Improvement District provides culinary water to residents of Wellington and, as a wholesale through private distribution companies, to many of the residents of the unincorporated but urbanized areas near Price. The district also makes some summer water sales to Price and Helper. Each new connection requires the purchase of one additional acre-foot of storage water in the Scofield Reservoir, where the district owns 1,600-acre feet of water rights. Expansion capabilities "are considered to be excellent."*

*John Short and Associates, *Sage Point/Dugout Canyon Project: Infrastructure and Community Plan*, p. 77 (Jan. 1983), as cited in Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

Table 2.20 Summary of Water System Characteristics by Area (1982)[a]

County/Community	Water Source(s)	Quantity Supplied	Storage Capacity (10^6 gal/d)	Filtration Plant		Connections	Distribution Capacity (number of connections)
				Design Capacity	Flow Capacity		
Carbon County							
East Carbon[b]	Surface water/springs	2.0 mgd	1.5	1.7 mgd	NA	963	NA
Helper[c]	Springs/Scofield Reservoir	0.8 mgd	4.3	NA	NA	1,100	NA
Price	Surface water/springs	3.6 mgd[d]	10.5	2.16 mgd	3.6 mgd	3,500	NA
Sunnyside[b]	Surface water/springs	b	b	b	NA	NA	NA
Wellington[c]	Scofield Reservoir	c	c	c	c	c	NA
Emery County							
Castle Dale[e]	Surface water	1,000 gpm	0.75	1,000 gpm	NA	654	900
Cleveland[f]	Surface water	275 gpm	NA	NA	NA	275	NA
Elmo[f]	Surface water						
Emery[e]	Wells	90-100 gpm	0.5	NA	NA	135	180
Ferron[e]	Surface water	1,250 gpm	0.75	1,250 gpm	NA	615	500
Green River[e]	Green River	1.5 mgd	0.5	1.5 mgd	NA	475	NA
Huntington[e]	Surface water	1,160 mgd	1.0	1,160 gpm	NA	950	1,050
Orangeville[e]	Surface water	750 gpm	0.5	750 gpm	NA	380	680

[a]Key to abbreviations: mgd = million gallons per day
gpm = gallons per minute
afd = acre feet per day
cfs = cubic feet per second
NA = not available

[b]East Carbon and Sunnyside share the same water system. The characteristics of the system are described under East Carbon in the text.

[c]Served by the Price Water Improvement District. The district draws water from the Scofield Reservoir and has 1,600 connections. The filtration plant has a design capacity of 4.0 mgd and has a flow capacity of 1.9 mgd.

[d]Quantity supplied during period of peak use.

[e]The Castle Valley Special Service District provides funding support for communities in Emery County.

[f]Served by the North Emery Water Users Association, a private system that can accommodate no new connections.

East Carbon and Sunnyside share a water system that is supplied by springs located within proposed tar sands development areas. According to the mayor of East Carbon, "mining in these areas could leave the communities without an adequate or usable water source."* An experimental "package" plant is being installed.

Price has seven million gallons per day available from springs and surface water. Currently, however, the Price treatment plant has a design capacity well under peak demand.

Emery County. The Castle Valley Special Service District operates the water systems in Castle Dale, Emery, Ferron, Huntington, and Orangeville. A separate irrigation water system is currently being installed by the district to increase the capacity of the water system in Ferron. Improvements are also planned for Huntington.

Cleveland and Elmo have received culinary water from the North Emery Water Users Association, a private system that can accommodate no new connections. The two towns have asked the Castle Valley Special Service District to construct a new public water system for them.

Green River receives water from the Green River. There are no problems with the system: there is considerable excess capacity, Green River can obtain new water rights, and the city has a new treatment plant.

Baseline Projection for Utility Services

Table 2.21 identifies the changes in utility service demands that would result from the baseline population projections. Additional service demands, corresponding to the baseline population increment, are calculated for each county between 1985 and 2005. Water system needs are presented in terms of the number of connections and the supply, storage, and treatment requirements in millions of gallons per day. Sewage system demands are also presented in millions of gallons per day. Since Utah does not have a solid-waste standard, an estimate of solid-waste disposal impacts could not be determined.

The demand for utility services between 1985 and 2005 is projected to increase twice as rapidly in Carbon County as in Emery County, when measured as an annual growth rate. Service demands are expected to increase in each county between 1985 and 1995 by 2.54% to 7.18% annually. In the following 10-year period, there would be slight decreases in utility service demands in

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*Mayor Dale Andrews, interview, May 3, 1983, as cited in Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

Table 2.21 Change in Utility Service Demands, by County and Year, Resulting from the Baseline Population Projections[a]

County/ Service Demands	Additional Service Demands, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Carbon County							
Water System							
Connections	2,390	3,975	4,620	4,714	4,872	6.81	0.53
Supply (10^6 gal/d)	3.8	6.4	7.4	7.5	7.8	6.89	0.53
Storage (10^6 gal/d)	1.9	3.2	3.7	3.8	3.9	6.89	0.53
Treatment (10^6 gal/d)	3.8	6.4	7.4	7.5	7.8	6.89	0.53
Sewage System (10^6 gal/d)	0.7	1.2	1.4	1.5	1.5	7.18	0.69
Solid Waste[b]							
Emery County							
Water System							
Connections	842	1,094	1,171	1,058	1,000	3.35	-1.57
Supply (10^6 gal/d)	1.3	1.8	1.9	1.7	1.6	3.87	-1.70
Storage (10^6 gal/d)	0.7	0.9	0.9	0.8	0.8	2.54	-1.17
Treatment (10^6 gal/d)	1.3	1.8	1.9	1.7	1.6	3.87	-1.70
Sewage System (10^6 gal/d)	0.3	0.3	0.4	0.3	0.3	2.92	-2.84
Solid Waste[b]							

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and population projections from the UPED model output, Utah Office of the State Planning Coordinator (June 1983). See Appendix A for service standard guidelines.

[b]The State of Utah Community Facility Guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste-disposal impacts could not be determined.

Emery County and increases in Carbon County. The change in demand would show little variation between the different types of utility services.

Given the limited amount of information available on current daily sewage treatment (see Table 2.18), it is difficult to measure the ability of existing sewage treatment facilities to meet the baseline demand projections. The number of connections to the water system would double in Carbon County and increase by a factor of 1.2 in Emery County by 2005. Some of this growth should be able to be accommodated by the present systems since excess capacity would be available, at least in the near term.

2.4.6 Other Services

This section describes the social and recreational facilities and programs that are available in the communities of interest in the region. Baseline projections for library and park facilities are also included.

Identification of Other Services in the Counties*

Carbon County. A wide variety of recreational facilities -- including parks, ball fields, playgrounds, gymnasiums, and swimming pools -- are available throughout the county. Organized community recreation programs and movie theaters are present in a few cities. Residents list numerous forms of outdoor recreation, family- and church-centered activities, shopping, movies, and cultural events at the College of Eastern Utah as choices for leisure activities. Public libraries are located in Helper and Price. Churches are the most common civic organization, and Scouts, 4-H, Big Brother/Sister, and other church organizations are available for youth. The only social agencies and day care centers in the county are located in Price.

Emery County. Community recreation programs are operated year-round in several of the cities in the county. Each of the cities has parks, ball fields, and other recreational facilities. Hunting, fishing, other forms of outdoor recreation, and family- and church-centered activities are listed by residents as leisure activities. Public libraries are located in Castle Dale, Cleveland, Ferron, Green River, Huntington, and Orangeville. Civic organizations include churches, PTA, and American Legion, while Scouts, 4-H, and church organizations are among the activities available for youth. Private child care can be found in several cities.

Baseline Projections of Parks and Library Services

Table 2.22 presents the changes in demand for park and library services brought about by the baseline population changes. Since parks or recreational facilities have been identified in each of the communities of interest, changes in the demand for park services were projected for each community. Changes in the demand for library services were projected only for those communities in which an existing public library was identified. The greatest number of additional parks and library services would be needed in Price. Through 2005, a decreasing number of additional parks and library services would be needed in East Carbon, Sunnyside, and -- in 1985 only -- in Green River.

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*Data sources used to prepare this profile are: U.S. Department of Energy, Region VIII, *Regional Profile -- Energy-Impacted Communities*, DOE/TIC-100D1 (March 1979); and Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

Table 2.22 Change in Park and Library Service Demands, by County and Year, Resulting from Baseline Population Projections[a]

County/Community	Change in Park Services, by Year[b,c] (number of acres)					Change in Library Services, by Year[b,c] (number of books/space requirements in sq ft)				
	1985	1990	1995	2000	2005	1985	1990	1995	2000	2005
Carbon County										
East Carbon	-3	-5	-5	-6	-6	-	-	-	-	-
Helper	5	8	8	8	9	1,532/383	2,352/588	2,552/638	2,552/638	2,752/688
Price	26	44	52	55	57	8,428/2,107	14,428/3,607	17,228/4,307	18,228/4,557	18,828/4,707
Scofield	1	1	1	1	1	-	-	-	-	-
Sunnyside	-1	-2	-2	-2	-2	-	-	-	-	-
Wellington	5	8	9	9	9	-	-	-	-	-
Emery County										
Castle Dale	5	6	7	6	6	1,480/370	1,980/495	2,180/545	1,980/495	1,880/470
Cleveland	1	1	1	1	1	116/29	176/44	196/49	176/44	156/39
Elmo	1	1	1	1	1	-	-	-	-	-
Emery	1	1	1	1	1	216/54	216/54	236/59	216/54	216/54
Ferron	4	3	4	3	3	1,064/266	964/241	1,164/291	964/241	964/241
Green River	-1	1	1	1	1	-172/-43	48/12	88/22	88/22	88/22
Huntington	4	5	5	4	4	1,068/267	1,368/342	1,368/342	1,168/292	1,068/267
Orangeville	4	5	5	5	4	1,122/281	1,382/346	1,382/346	1,382/346	1,322/331

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah, and the UPED model output, Utah Office of the State Planning Coordinator (June 1983). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]Population declines were projected by UPED for particular communities of interest in this study. As a result, public services and facilities that currently exist would be made more available to the general public if these services and facilities were being used at or above their designated capacity. An accurate determination of the change in existing operating conditions for services and facilities as a result of the baseline population projections is not made herein.

2.5 FISCAL AND MANAGEMENT CONDITIONS

This section describes the fiscal and management conditions of the counties and communities in the region. Government finances and management conditions are detailed first (Sec. 2.5.1), followed by a description of school district finances (Sec. 2.5.2). Each section includes both the counties and the communities of interest for this report.

2.5.1 Government Finances and Management Conditions

Table 2.23 provides a summary of the fiscal position of the counties and communities in the region. *Average* annual revenues and expenditures are presented for calendar years 1980 through 1982 for the counties and for fiscal years 1981 and 1982 for the communities. *Current* annual revenues and expenditures are presented for calendar year 1983 for the counties and for fiscal year 1983 for the communities. The 1982 mill levy and assessed valuation is also presented for each county and community. A more detailed fiscal profile for each county and community of interest is included in Appendix D, Tables D.1-D.2. A description of management conditions is provided for each county.

Carbon County. Carbon County had an average annual revenue of more than $4.2 million between 1980 and 1982. Property taxes accounted for almost 41% of this total. Federal transfers, miscellaneous revenues, and service charges each accounted for more than 10% of county revenues during this period.

In 1983, the county received revenues totaling almost $5.2 million, an increase of 21% compared to the previous three years. Property tax revenues grew from $1.75 million to $2.26 million, while federal transfers doubled, from $586,000 to $1.2 million. Figure 2.10a illustrates the distribution of revenues by category.

Similar increases occurred within the communities in the county. Revenues in Price rose from an average of $6.6 million in 1981 and 1982 to $7.9 million in 1983. In the same period, revenues increased 42% in East Carbon, 42% in Wellington, 19% in Sunnyside, and 4% in Helper. In East Carbon, Helper, Price, and Wellington, service charges were the primary source of revenue, accounting for as much as 67% of total revenues in Helper in 1983. Sales taxes and miscellaneous revenues were other main sources of revenue in each community (see Table D.1).

Expenditures in Carbon County averaged $4.3 million between 1980 and 1982. Law enforcement (14%), roads (18%), and general administration (53%) were the largest expenditures for the county. In 1983, county expenditures reached almost $5.2 million — a growth of 20% over the previous three years. Law enforcement, roads and general administration still accounted for 82% of total expenditures (Fig. 2.10b).

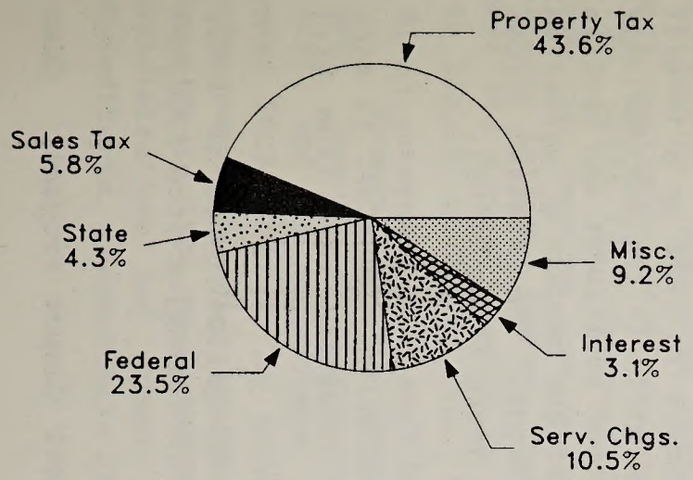
Table 2.23 Fiscal Condition of the Counties and Communities

County/Community	Revenues (10^6)			1982 Mill Levy	1982 Assessed Valuation (10^6)	Expenditures (10^6)		
	Average Annual[a]	Current Annual[b]	Percent Difference			Average Annual[a]	Current Annual[b]	Percent Difference
Carbon County	4.278	5.192	21.37	16.00	115.190	4.320	5.180	19.91
East Carbon	0.278	0.396	42.45	18.18	3.540	0.414	0.515	24.40
Helper	1.831	1.905	4.04	8.00	6.860	1.511	1.695	12.18
Price	6.573	7.948	20.92	14.35	28.668	6.376	8.019	25.77
Sunnyside	0.200	0.238	19.00	6.00	0.979	0.193	0.268	38.86
Wellington	0.328	0.465	41.77	11.16	3.137	0.345	0.462	33.91
Emery County	5.998	6.453	7.59	16.22	233.820	5.799	6.452	11.26
Castle Dale	0.454	0.358	-21.15	14.00	3.893	0.418	0.434	3.83
Cleveland	-	0.174	-	11.00	0.844	-	0.075	-
Elmo	-	0.050	-	11.00	0.591	-	0.029	-
Emery	-	0.081	-	17.65	0.601	-	0.060	-
Ferron	0.347	0.352	1.44	18.65	3.377	0.314	0.353	12.42
Green River	0.256	0.275	7.42	21.00	2.287	0.126	0.322	155.56
Huntington	-	0.577	-	14.25	5.091	-	0.588	-
Orangeville	0.243	0.236	-2.88	21.63	2.704	0.168	0.158	-5.95

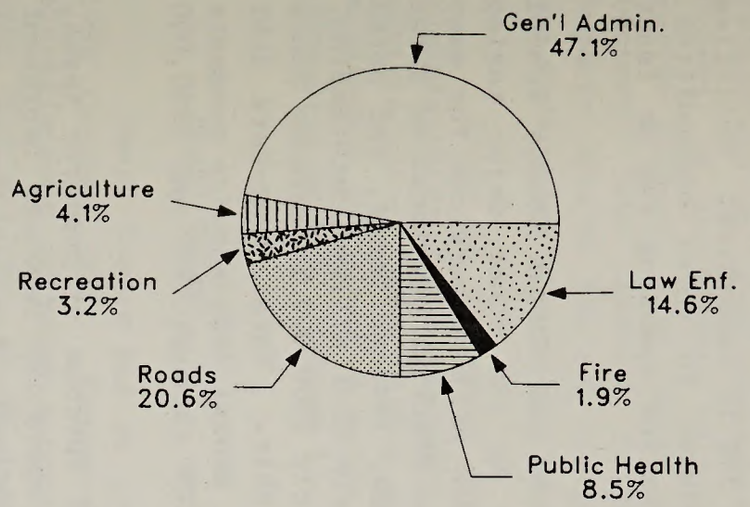
[a]Revenue and expenditure budgets for the counties reflect 1980-82 averages, while for the communities it represents 1980-81 and 1981-82 fiscal years.

[b]Current annual budgets reflect 1983 fiscal year data for the counties and 1982 fiscal year data for the communities.

Source: adapted from Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).



a Current Annual Revenue
($5.192 x 10^6)



b Current Annual Expenditures
($5.180 x 10^6)

c Revenue Base Components

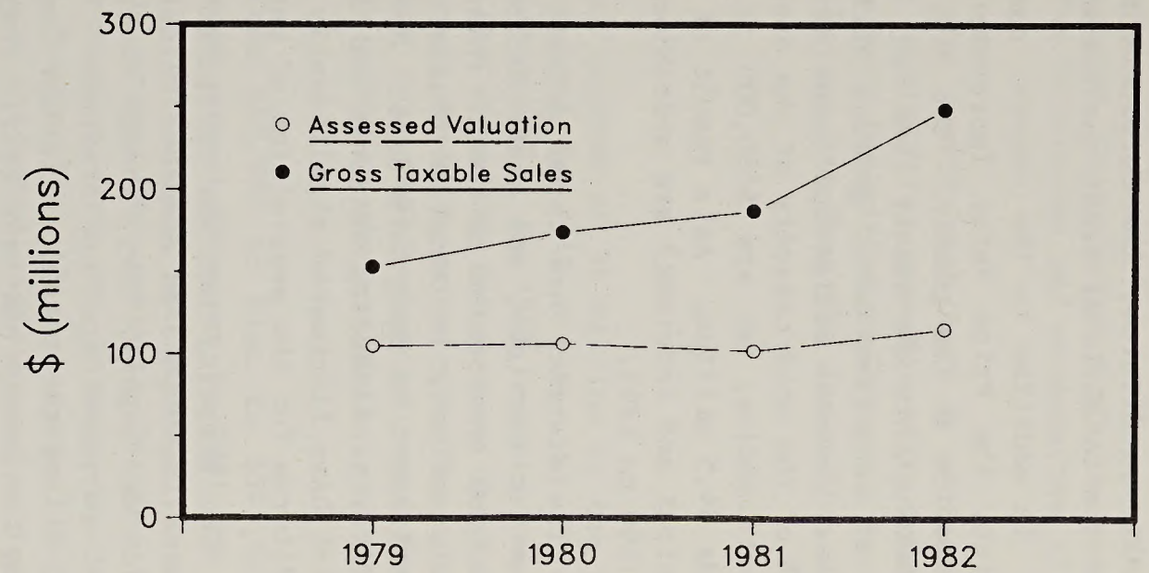


Fig. 2.10 Current Fiscal Profile of Carbon County

Price had the highest spending of any community in the county between 1981 and 1982 -- a total of almost $6.4 million. East Carbon, Helper, Sunnyside, and Wellington combined for another $2.5 million. Utilities were the greatest expenditure in each community except Sunnyside, where general expenditures were highest. In 1983, the increase in expenditures over the previous two years ranged from 12% in Helper to 39% in Sunnyside. Utilities accounted for more than 60% of total expenditures in three communities. General expenditures, law enforcement, and recreation spending was at least 10% of the total in at least one community.

In addition to the county, communities, and the Carbon County School District, the Price Water Improvement District is the other major taxing jurisdiction in the county. The district provides utility services for many residents within the county (see Sec. 2.4.5). The district has incurred three forms of long-term debt: general obligation bonds, revenue bonds, and notes payable. General obligation bonds amount to nearly $3.2 million outstanding, or 40% of the bond capacity of the district. Nearly $900,000 in revenue bonds are outstanding, as are $450,000 in notes payable. Total long-term debt exceeds $4.5 million. As a result of this debt, annual debt-service payments (principal and interest) are approximately $320,000 through 1990 and $280,000 from 1990 to 1995.

The district has three primary sources of revenue -- property taxes, charges for services, and contributions. While operating revenues represent the largest proportion of total revenues, the property tax has become more crucial, not only in terms of financing the operation of the system, but also for retirement of long-term debt. Operating revenue does not cover operating expenditures, excluding interest and depreciation. Total expenditures of the district have fluctuated significantly through time, primarily due to variable expenditures for the acquisition of water stock.*

The property tax was collected in Carbon County in 1982 by a 16-mill levy on $115,190,463 in assessed valuation. Sixteen mills is the maximum levy counties may legally levy, though their levies for bond retirement and certain special purposes are not limited. The largest single source of valuation (about 31% of the total) in Carbon County is coal mines. The assessed valuation in the county has been fairly stable in recent years (Fig. 2.10c).

Mill levies in the communities in 1982 ranged from 6 in Sunnyside to 18 in East Carbon. The assessed valuation has held relatively constant in each community except Wellington, where the assessed valuation rose from $2.3 million in 1979 to $3.1 million in 1982.

Carbon County had no outstanding general obligation bonds in 1981. East Carbon, Helper, and Price had indebtedness in 1982 ranging from $200,000

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*John Short and Associates, Inc., *Sage Point/Dugout Canyon Project: Cost Analysis and Revenue Study*, p. 117 (Feb. 1983).

to $800,000. Wellington had $6,000 in outstanding general obligation bonds in 1981, and until the 1982 water bond issue Sunnyside had no indebtedness.

Carbon County has a full-time professional planner, and land-use controls which have been explicitly designed to deal with the approval (or rejection) of large energy-related developments. The county uses the local Council of Governments to involve the incorporated cities in the development review process. The county also cooperates with Emery County in an agreement (entered into pursuant to Utah's Interlocal Cooperation Act) to consider impacts outside its own jurisdiction. The ordinances and cooperative efforts are indicative of a strong planning system.

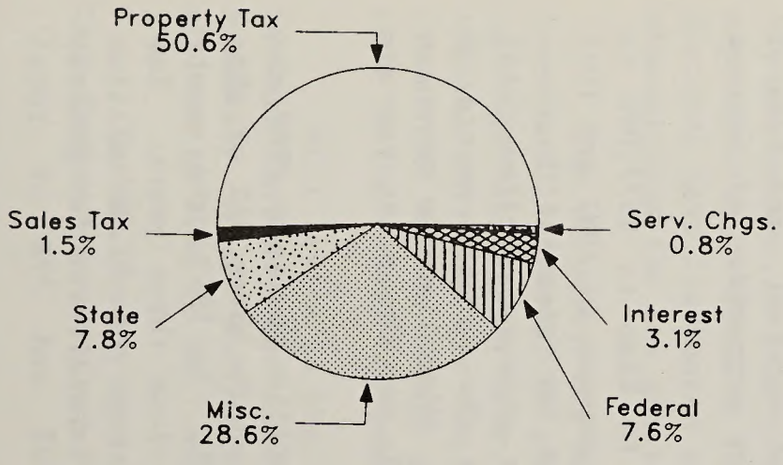
Price is the only community in the county with both a professional administrator and a planning consultant, while Wellington has a professional administrator. East Carbon and Sunnyside have identified eroding tax bases as management problems. A major concern in Helper has been the separation of the community by U.S. Highway 6.

Emery County

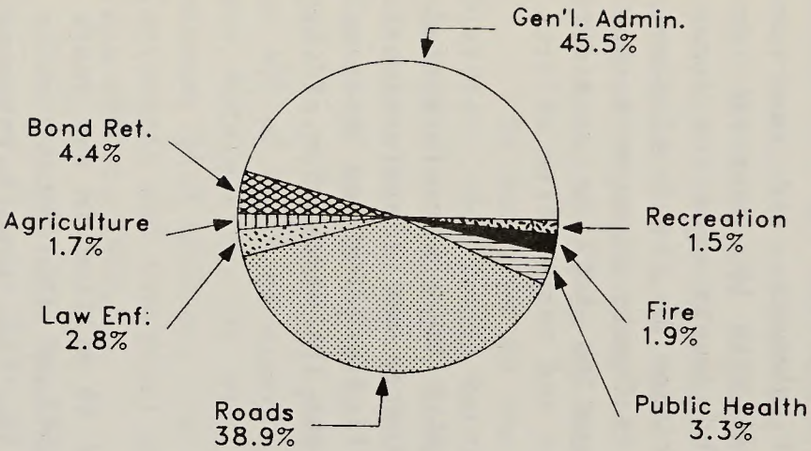
Emery County had an average annual revenue of $6 million in the years 1980 through 1982. Property taxes accounted for 54% of the total, while miscellaneous revenues accounted for another 20%. In 1983, county revenues were $6.4 million, an 8% increase over the preceding three years (see Table 2.23). Miscellaneous revenues increased most rapidly, state transfer payments increased somewhat less rapidly, property taxes held constant, and federal transfer payments declined. Figure 2.11a exhibits the proportion of current revenue by origin.

Current annual revenues ranged from $50,000 in Elmo to $577,000 in Huntington. For those cities where average annual revenues in 1981 and 1982 were available, 1983 revenues in Green River showed the greatest increase (7%), while 1983 revenues in Castle Dale showed the greatest decline (21%) from the previous two years. Service charges were the largest source of revenue in Elmo, Ferron, Huntington, and Orangeville. Miscellaneous revenues were the largest source in Castle Dale and Cleveland, and the sales tax was the largest source in Green River.

Expenditures in Emery County averaged $5.8 million between 1980 and 1982. General administration and roads each accounted for over 31% of this total, and law enforcement accounted for another 22%. In 1983, the county spent $6.5 million, an increase of 11% over the previous three years. Law enforcement spending declined sharply from an average of $1.26 million annually in 1980 through 1982 to $182,000 in 1983. Expenditures for general administration and roads increased to become 45% and 39% of total expenditures, respectively (Fig. 2.11b).



a Current Annual Revenue
($6.453 x 10^6)



b Current Annual Expenditures
($6.452 x 10^6)

c Revenue Base Components

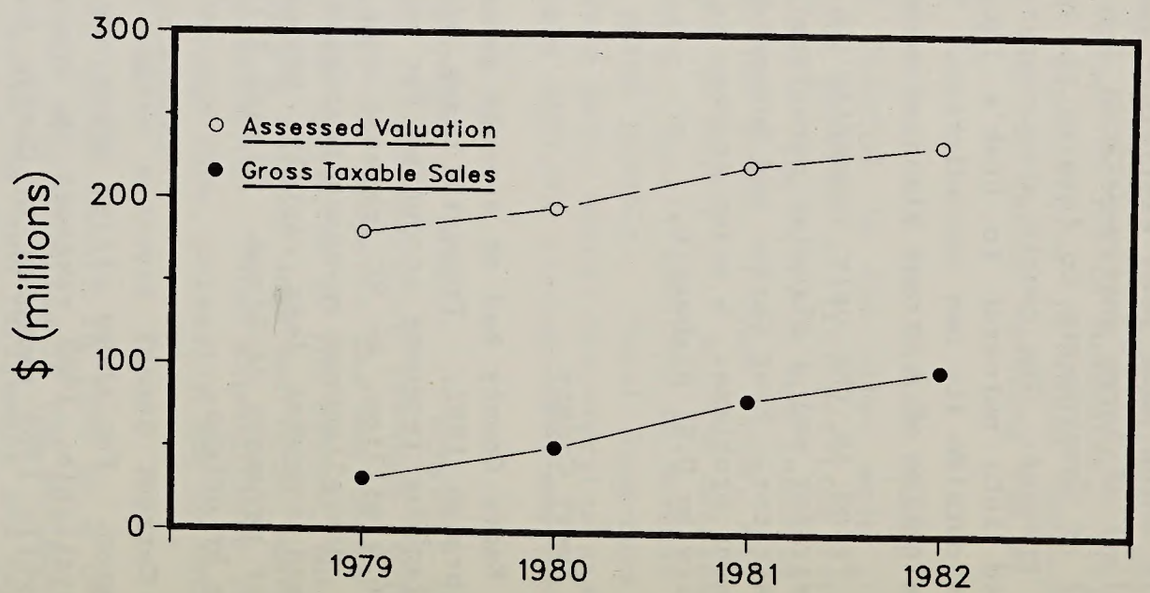


Fig. 2.11 Current Fiscal Profile of Emery County

The eight communities of interest in Emery County spent a combined total of just over $2 million in 1982. The biggest increase over the preceding two years was in Green River, where expenditures rose 156%. Expenditures for utilities were the largest category of spending in Castle Dale, Elmo, Ferron, and Orangeville. General expenditures were the largest category of spending in Cleveland, Emery, and Huntington. Expenditures for streets were the largest category in Green River.

The property tax in Emery County was raised in 1982 by a 16.2-mill levy on $233,819,867 in assessed valuation. About 73% of the total valuation in the county is in the Hunter and Huntington Canyon power plants. Coal mines associated with the power plants and producing for other markets make up an additional 14% of the valuation. Figure 2.11c shows that the assessed valuation has risen only slightly since 1979.

Among the communities in Emery County, the mill levy in 1982 ranged from 11.0 in Cleveland and Elmo to 21.6 in Orangeville. The assessed valuation rose steadily between 1979 and 1982 in each of the eight communities, reaching a peak of $5.1 million in Huntington in 1982.

In 1981, Emery County had $2,363,587 in outstanding general obligation bonds. The high assessed valuation of the county left it, however, with the capacity to enter into at least an additional $21 million of indebtedness. Between 1980 and 1982, the cities in the county had outstanding debts ranging from $116,000 in Ferron to $1.1 million in Huntington. Cleveland did not have any outstanding debts.

Transfers from the state and federal government have made up about 15% of the Emery County revenue in recent years. A strong property tax base in Emery County frees it from the dependence that many Utah counties have on state and federal transfer payments.

The extensive use of shared services in Emery County has been an effective response to past growth. The scope of cooperation has even expanded to include a formal agreement (pursuant to Utah's Interlocal Cooperation Act) between Emery and Carbon counties to coordinate their approvals of major energy-related facilities. The one exception to the cooperative provision of services in Emery County is Green River, which is isolated from population centers in the rest of the county. The isolated nature of Green River could have an impact on the responsiveness of the county to growth there.

Emery County does not have a full-time professional planner, but it does have a part-time zoning administrator (the county is zoned) and an active

planning commission. Planning should consider some resistance to growth, the attitude reported for some long-time Emery County residents.*

In addition to the county, community, and school districts, the Castle Valley Special Service District (CVSSD) is a major taxing jurisdiction in the county. The CVSSD has incorporated the water, sewer, drainage and road needs of Castle Valley communities (Cleveland, Elmo, Huntington, Castle Dale, Orangeville, Ferron, and Emery) into a taxing district that includes both the communities and the power plants. This gives the district substantial financial power: since 1977, it has bonded for $20 million to support a variety of improvements.

The CVSSD currently has an assessed valuation of $182,461,301 and levies 5.91 mills on that amount. The CVSSD levy is projected to rise to about 14 mills by the time its full program of improvements is in place and all authorized bonds are sold. The operations of the CVSSD are financed by user charges collected by the member communities.

2.5.2 County School District Finances

Carbon County

The Carbon County School District spent $10 million in 1982. Forty percent of this was raised from property taxes through a 43.66 mill levy on the $115,190,463 valuation of the district. The assessed valuation per student was $20,788 in 1981-82. The budget in the school district rose dramatically, along with its mill levy, in 1980 and has been quite stable (at between $10 and $11 million) since then. The increases in the budget and mill levy reflect a substantial increase in capital outlays.

Starting salaries in the Carbon School District were slightly above the state average in 1982-83: $13,849, compared to the state average of $13,682. But the maximum salaries were somewhat below average: $22,638 as compared with $23,854 for a teacher with a master's degree and 12 years of experience.

Carbon County spent $2,130 per student in 1981-82 slightly below the state average of $2,254.

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*Interview, Les Prall, Southeast Utah Association of Governments, and James Whear, District VII Mental Health Services (May 3, 1983), and Interview, Jo Ann Behling, Ferron Clerk-Recorder (May 10, 1983), as cited in Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

Emery County

About 75% of the $12 million in the Emery County School District expenditures in 1982 was raised from property taxes through a 38.75-mill levy on the district's $233,819,867 valuation. The district ranks as the fifth wealthiest in Utah in terms of assessed valuation per student, $66,427 in 1981-82, and there has been steady growth in the valuation available to support school expenditures. The tax levy of the school district includes a two-mill "leeway," approved by the voters of the county and devoted to salary improvements. Starting salaries in the Emery School District were the highest in the state: $16,510, compared to the state average of $13,682. Maximum salaries were also the highest: $26,680, compared to $23,854 for a teacher with a master's degree and 11 years of experience.

Emery County spent $4,168 per student in 1981-82, almost double the state average of $2,254.

2.6 QUALITY OF LIFE

This section describes the two-county area in terms of crime rates, divorce rates, alcoholism and drug abuse, and unemployment. When possible, county statistics are related to comparable Utah and national information.

2.6.1 Carbon County

As seen in Fig. 2.12, the crime rate in Carbon County was about 41 per 1,000 population between 1978 and 1981. This was below the Utah rate, which increased from 53 per 1,000 in 1978 to 56 per 1,000 in 1981. The countywide incidence of serious crimes, however, rose 40% between 1978 and 1979. The suicide rate in the county for the period from 1977 through 1981 was 15.21 per 100,000, compared to a Utah rate of 12.52 and a U.S. rate of 12.64. The divorce rate in Carbon County increased from 3.2 per 1,000 in 1972 -- well below state and national averages -- to 5.3 per 1,000, identical to the U.S. and Utah rates. There were 1.95 drug-abuse arrests per 1,000 population in Carbon County in 1981, compared to the state rate of 2.68 per 1,000. Arrests for alcohol violations in the county were also less than those in the state as a whole in 1981: 11.74 per 1,000 in Carbon County as opposed to 16.02 per 1,000 in Utah. The county unemployment rate in April 1983 was 18.8%.

2.6.2 Emery County

Figure 2.12 shows that the crime rate in Emery County rose steadily from 18 per 1,000 population in 1978 to 43 per 1,000 in 1981. The 1981 rate was still below the state rate for that year of 56 per 1,000. The average annual suicide rate for the county between 1977 and 1981 was 12.02 per 100,000 population, slightly less than the Utah rate of 12.52 and the U.S. rate of

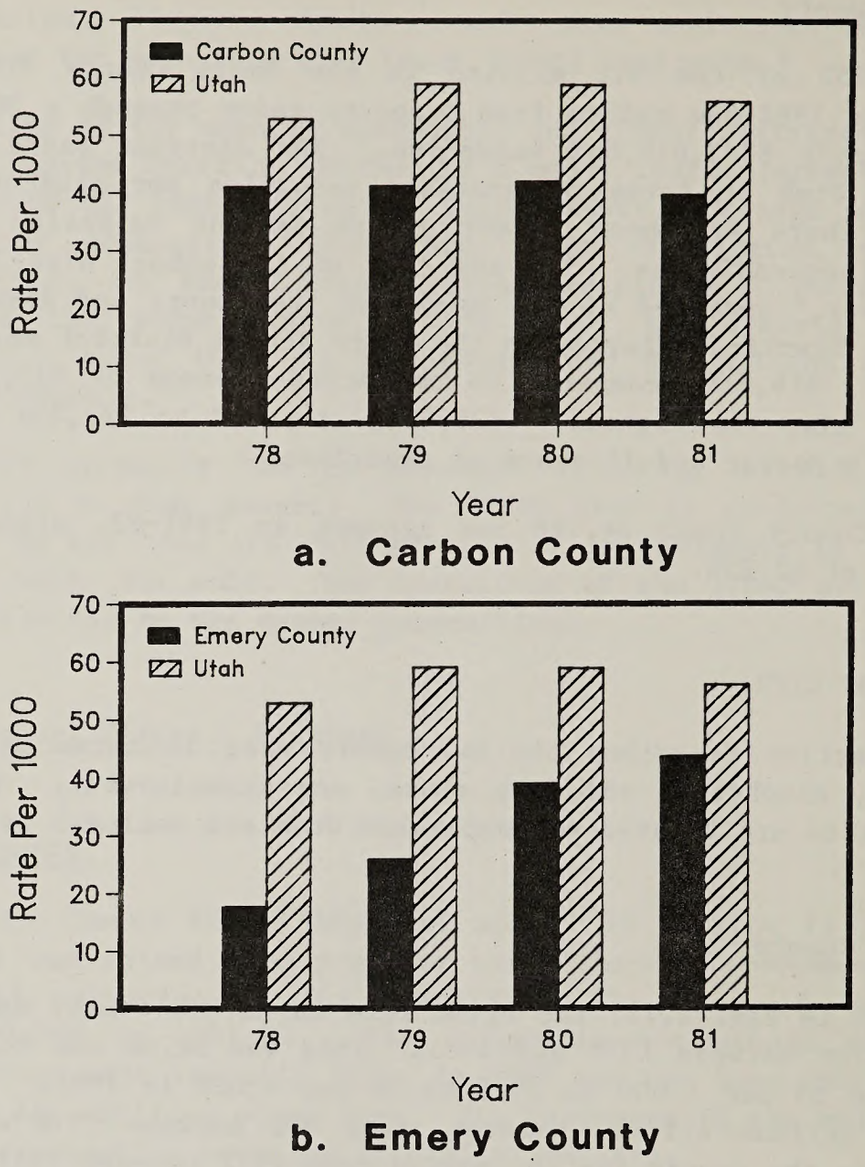


Fig. 2.12 General Crime Rate Statistics by County

12.64. The 1981 divorce rate in the county of 3.7 per 1,000 population, while much higher than the 1972 rate of 0.2 per 1,000, was still well below the state and national rate of 5.3 per 1,000. There were 1.47 drug-abuse arrests per 1,000 population in Emery County, compared to a state figure of 2.68 drug-abuse arrests per 1,000. Similarly, the 8.37 alcohol arrests per 1,000 population in 1981 were far fewer than the 16.02 alcohol arrests per 1,000 in the state during the same year. The unemployment rate in Emery County in April 1983 was 11.2%.

3 DESCRIPTION OF THE DEVELOPMENT SCENARIOS FOR THE SUNNYSIDE STSA

This section discusses the manpower requirements and production levels associated with the development of the Sunnyside Special Tar Sands Area (STSA). The three commercialization scenarios considered in this report correspond to the potential development alternatives. In the proposed action development scenario, total production is projected to be 115,000 barrels per day (bbl/d). Under the partial conversion development scenario 80,000 bbl/d would be produced. Under the last scenario being considered -- unitized development -- 50,000 bbl/d of productive capacity are expected. All three scenarios are composed of company-specific project plans and expected future developments.

For the purposes of this report, the individual tar sands projects and their different development plans have been grouped into the three Sunnyside STSA scenarios. Only the development effects/impacts of these three scenarios are directly considered in this report.

Figure 3.1 illustrates the geographic location of all nine STSAs located in the east-central part of Utah. The nine development areas are situated in seven Utah counties: Carbon, Duchesne, Emery, Garfield, Grand, Uintah, and Wayne. This report considers only the potential development impacts of the Sunnyside STSA, located in eastern Carbon County. Although only two towns are adjacent to the Sunnyside STSA -- East Carbon and Sunnyside -- there are numerous established communities in western Carbon County and northern Emery County. Figure 3.2 identifies the specific tracts that have been submitted for hydrocarbon lease conversions. The proposed company-specific conversions are interspersed throughout the Sunnyside STSA.

Each Sunnyside STSA development scenario has a unique development schedule that extends between the years 1985 and 2005. In addition, the projects defined under each commercialization scenario are different. In the following paragraphs, the direct manpower requirements by scenario are discussed.

3.1 DIRECT MANPOWER REQUIREMENTS FOR PROPOSED ACTION DEVELOPMENT SCENARIO

Under the proposed action development scenario there are assumed to be four surface and one in-situ tar sands projects. Although total production from these projects is projected to be 115,000 bbl/d, production is expected to vary significantly by project -- from 5,000 bbl/d for the Sabine project to 50,000 bbl/d for the Amoco project.

Table 3.1 shows the annual manpower requirements that would correspond to each project, together with the type of each project (in-situ or surface) and their total production levels. The construction phase of the three projects is projected to begin in 1984 (Mono, Amoco Oil Co., and Sabine).

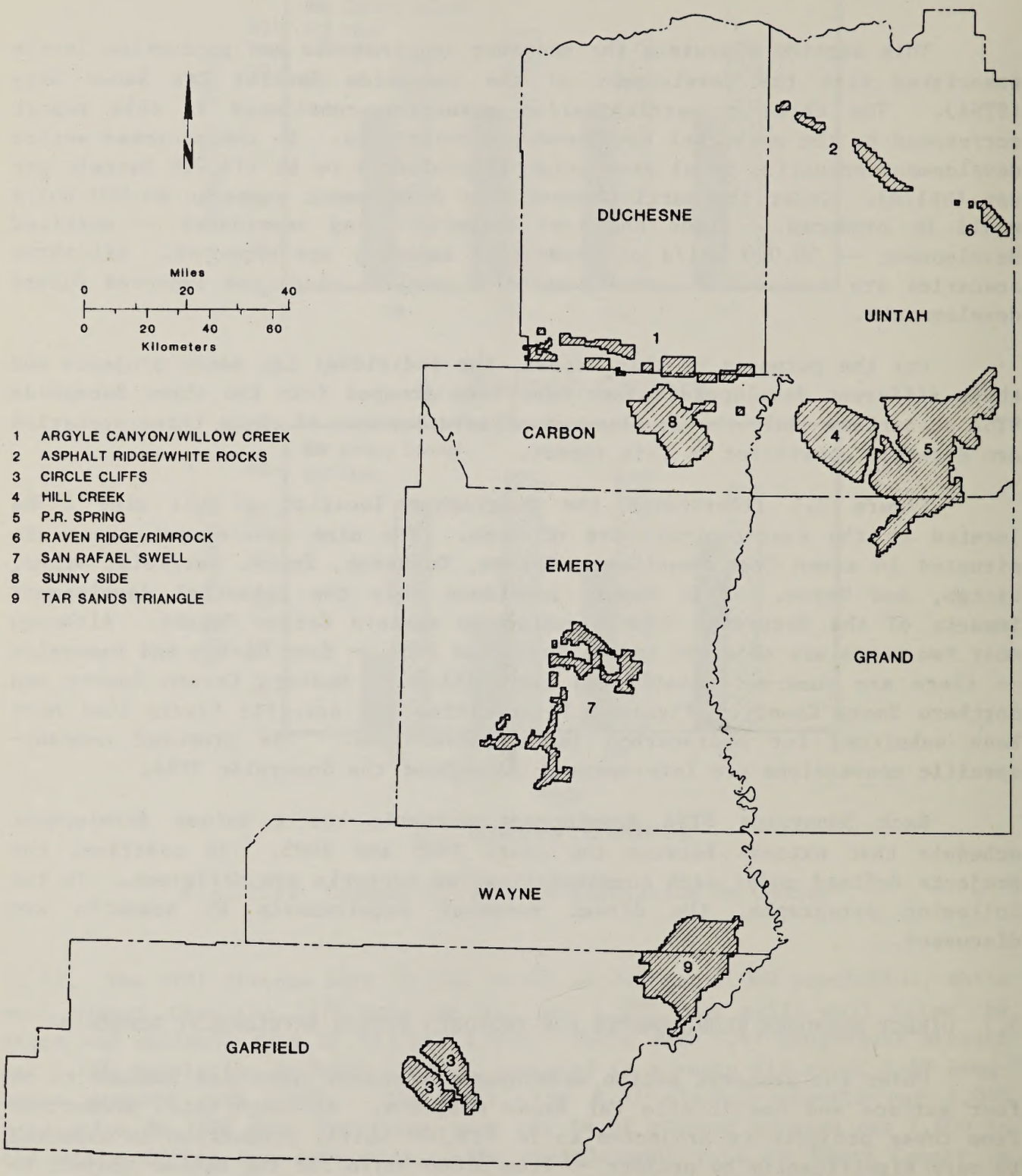
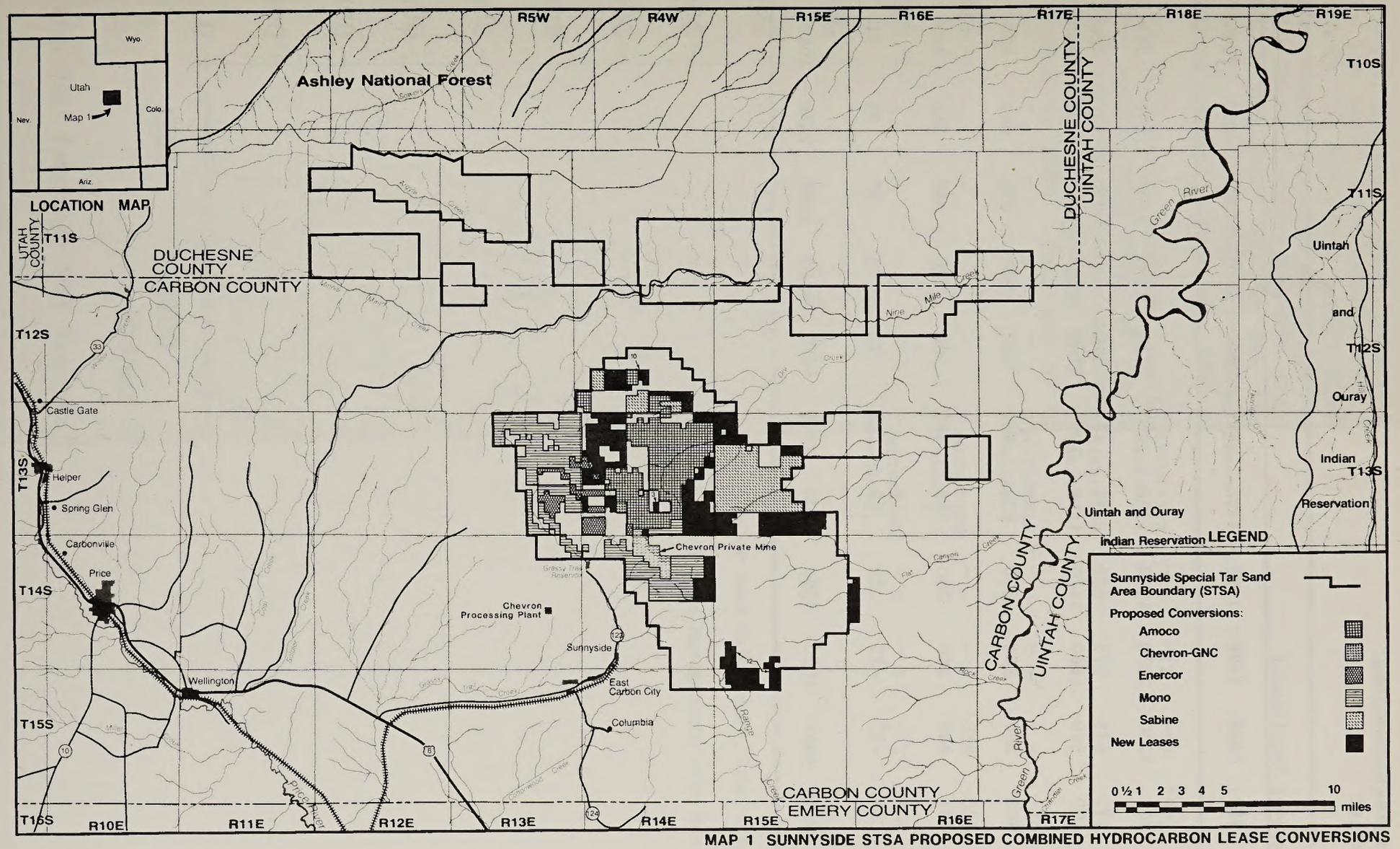


Fig. 3.1 Location of the Sunnyside STSA Relative to the Other Tar Sands Areas in Utah



MAP 1 SUNNYSIDE STSA PROPOSED COMBINED HYDROCARBON LEASE CONVERSIONS

Fig. 3.2 Proposed Combined Hydrocarbon Lease Conversions in the Sunnyside STSA

Table 3.1 Annual Construction and Operation Manpower Requirements, by Project, for the Proposed Action Scenario

Project	Type of Developments	Cumulative Production (bbls/day)	Phase	Annual Manpower Requirement																				
				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Mono[a]	Surface	30,000	Construction	12	12	50	1892	1800	1800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Operation	-	-	-	-	15	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230
Amoco[a]	Surface	50,000	Construction	10	10	10	10	10	10	10	10	10	375	475	475	475	475	475	475	320	320	320	320	100	-
			Operation	-	-	-	-	-	-	-	-	-	175	400	670	1160	1170	1180	1295	1705	1825	1925	2465	2465	2465
EnerCor[a]	Surface	20,000	Construction	-	-	-	50	500	2000	2500	1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Operation	-	-	-	-	50	50	200	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Chevron[b]	Surface	10,000	Construction	-	-	-	-	-	-	15	35	-	850	2000	850	-	-	-	-	-	-	-	-	-	-
			Operation	-	-	-	-	-	-	11	35	35	35	35	380	380	380	380	380	380	380	380	380	380	380
Sabine[a]	In-situ	5,000	Construction	5	5	5	30	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Operation	-	-	-	25	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Total Proposed Development		115,000		27	27	65	2007	2470	5125	4001	3145	2110	3500	4975	4440	4080	4090	4100	4215	4470	4590	4690	5230	5010	4910

[a]Source: adapted from unpublished information, Bureau of Land Management, Utah State Office (April 1983).

[b]Source: adapted from unpublished information, Bureau of Land Management, Utah State Office (Feb. 1984).

The earliest operation phase commences in 1987. The last row in Table 3.1 presents the total labor requirements for the five projects. Total manpower requirements for the construction phase is expected to peak at 3,810 workers in 1989. Operating manpower would peak in 2003, when 4,910 people would be employed. Overall, total manpower requirements would reach a maximum of 5,230 in 2003. Manpower fluctuations would occur throughout the period, as evidenced by the fact that the manpower projections for 1992 would be less than half of the projections for 1994 or 2000.

The individual manpower profiles by scenario are displayed in Fig. 3.3. The construction phase of the proposed action scenario is not clearly identified in this figure. Construction employment is indicated to expand very rapidly between 1987 and 1989 -- reaching its peak level for the whole study period in 1989. Four out of five projects would be developed during

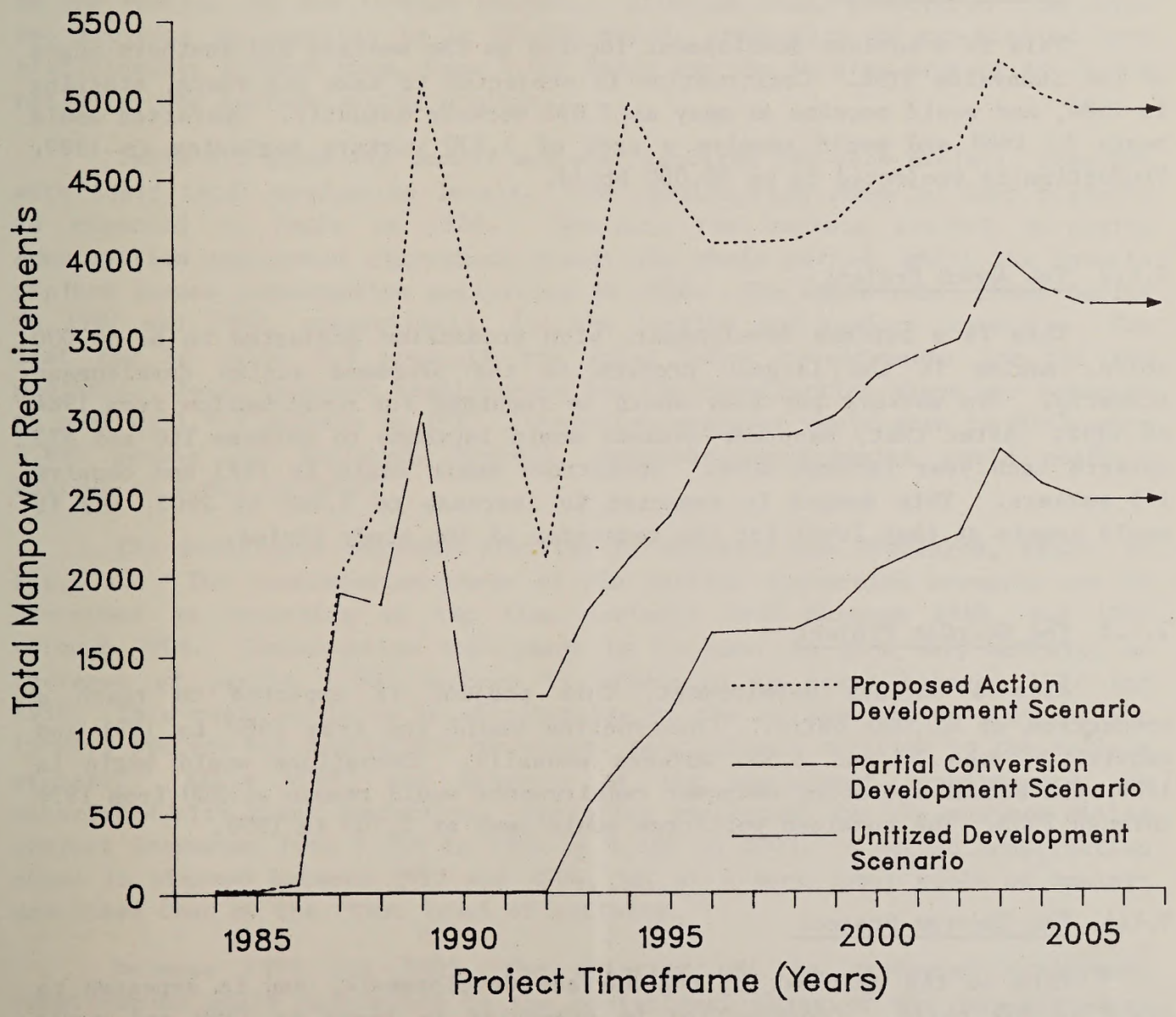


Fig. 3.3 Sunnyside STSA Manpower Profiles by Development Scenario

this time frame, thereby precipitating the drastic increase in employment within the three-year period. The level of employment declines between 1990 and 1992 due to the completion of the construction phases for three projects. In 1993, total employment resumes a growth trend until 2003, as a result of the construction-phase manpower demands of the Amoco project.

Between 1993 and 2005, the majority of the projected employment requirements would correspond to the operational phase of the projects. In 2005, all projected employment would be required for plant operations. The future employment level to be maintained is indicated in Fig. 3.3 by the arrow. Each project employment schedule is discussed below.

3.1.1 The Mono Project

This is a surface development located on the western and southern edges of the Sunnyside STSA. Construction is projected to take six years, starting in 1984, and would require as many as 1,892 workers annually. Operation would begin in 1988 and would require a crew of 1,230 workers beginning in 1989. Production is projected to be 30,000 bbl/d.

3.1.2 The Amoco Project

This is a surface development, with production projected to be 50,000 bbl/d, making it the largest project in the proposed action development scenario. Ten workers per year would be required for construction from 1984 to 1992. After that, manpower demands would increase to between 100 and 475 workers each year through 2004. Operations would begin in 1993 and require 175 workers. This demand is expected to increase to 2,465 by 2003, and it would remain at that level for the remainder of the study period.

3.1.3 The EnerCor Project

Also a surface development, this project is expected to reach a production of 20,000 bbl/d. Construction would run from 1987 to 1991 and require between 50 and 2,500 workers annually. Operations would begin in 1988, and annual operating manpower requirements would remain at 800 from 1991 through 2005. The combined workforce would peak at 2,700 in 1990.

3.1.4 The Chevron Project

This is the smallest of the surface developments, and is expected to yield 10,000 bbl/d. Construction is scheduled to begin in 1990 and would require a peak of 2,000 workers in 1994. Operation would also begin in 1990; the work force would reach 380 workers in 1995 and remain at that level until 2005.

3.1.5 The Sabine Project

This project is the only in-situ development in the proposed action development scenario. Construction would run from 1984 to 1988. A maximum of 60 workers in 1988 would be required for construction. In 1987 operations would commence, and 25 workers would be needed. From 1988 through 2005, 35 workers would be needed for operations. Production for this development would only be 5,000 bbl/d.

3.2 DIRECT MANPOWER REQUIREMENTS FOR THE PARTIAL CONVERSION DEVELOPMENT SCENARIO

Under the partial conversion development scenario, there are assumed to be one surface and one in-situ project. Although total production from these two projects is expected to be 80,000 bbl/d, production is expected to vary significantly between them, from 5,000 bbl/d for the in-situ project to 75,000 bbl/d for the surface mining project.

Table 3.2 shows the annual manpower required for each project, together with their total production levels. The construction phase of both projects is expected to begin in 1984. However, the surface project maintains construction employment throughout almost the whole period, while the in-situ project ceases construction activities in 1988. The operational phase begins in 1987 and 1988, respectively, for the in-situ and surface projects. The last row in Table 3.2 presents the total labor requirements for the two projects. Total manpower requirements for the construction phase are expected to peak at 1,877 workers in 1987. Operation manpower would peak in 2003, when 3,695 people are employed. Overall, manpower requirements would reach a maximum of 4,015 in 2003.

The individual manpower profiles by scenario are displayed, again, in Fig. 3.3. The construction phase of the partial conversion scenario can be discerned as occurring in two time periods; 1987 through 1989, and 1993 through 2004. Construction employment is forecast to grow very quickly; an increase of nearly 1,800 workers is scheduled to occur between 1987 and 1988. This rapid scale-up is attributable to the surface mining project; the in-situ project has negligible employment requirements relative to the surface project. After 1988, the majority of the employment requirements are associated with plant operations. Operating employment for the surface mining project increases from 1,195 in 1989 to 3,660 in 2003. A second construction phase is planned between 1993 and 2004, but at a much lower scale of employment than that of the first level of activity.

Between 1990 and 2005, the majority of the projected employment requirements would correspond to the operational phase of the two projects. In 2005, all projected employment would be needed for plant operating activities. The future employment level to be maintained is indicated in Fig. 3.3 by the arrow. Each project employment schedule is discussed below.

3.2.1 The Surface Mining Project

This project would produce 75,000 bbl/d under the partial conversion scenario. Construction would run from 1984 to 2004, and would fluctuate greatly throughout; a two-stage development program covers the years 1987-1989 and 1993-2004. A maximum of 1,847 workers would be needed in 1987, compared to only 10 in 1990-1992. Plant operations would start in 1988 and would require more than 1,000 workers in every year except the first one. Manpower demands for the operations phase are projected to level off at 3,660 for the period from 2003 to 2005.

3.2.2 The In-Situ Project

Under this scenario, the in-situ project would produce 5,000 bbl/d. A maximum of 60 workers would be required in any of the five construction years. Operations would require 25 workers in 1987 and 35 workers each year thereafter.

3.3 DIRECT MANPOWER REQUIREMENTS FOR THE UNITIZED DEVELOPMENT SCENARIO

The unitized development scenario contains a single surface mining tar sands development. Total production is projected to be 50,000 bbl/d.

Table 3.3 shows the annual manpower required for this unitized development project. The construction phase of this project is projected to begin in 1984 and continue at various levels throughout the period under study (to 2004). The operating phase commences in 1993.

The last row in Table 3.3 presents the total labor required for and production level of the scenario. Total manpower requirements are expected to peak at 2,785 workers in 2003. The majority of the employment required for this project is concentrated in the last 10 years of the study period.

As also shown for the other scenarios, the individual manpower profile of this scenario is displayed in Fig. 3.3. The employment level is shown to grow continuously until 2004, when a minor adjustment occurs, before the long-term work force level is stabilized. The individual project work force schedule is further described below.

The unitized development project is a surface mining tar sands development. Production under this scenario would reach 50,000 bbl/d. Ten workers would be required for construction during each year from 1984 to 1992. However, construction is projected to last until 2004, with between 100 and 500 workers required each year after 1992. Operations are expected to begin in 1993, and manpower demands would then increase rapidly. As many as 2,465 workers would be required for operations in 2003-2005, compared to the 175 projected for 1993.

Table 3.2 Annual Construction and Operation Manpower Requirements, by Project, for the Partial Conversion Scenario

Project	Type of Development	Cumulative Production (bbls/day)	Phase	Annual Manpower Requirement																				
				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Surface Mining	Surface	75,000	Construction	17	17	55	1847	1715	1810	10	10	10	375	475	475	475	475	475	475	320	320	320	320	100	–
			Operation	–	–	–	–	15	1195	1195	1195	1195	1370	1595	1865	2355	2365	2375	2490	2900	3020	3120	3660	3660	3660
In-situ Production	In-situ	5,000	Construction	5	5	5	30	60	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			Operation	–	–	–	25	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Total Partial Conversion Development		80,000		22	22	60	1902	1825	3040	1240	1240	1240	1780	2105	2375	2865	2875	2885	3000	3255	3375	3475	4015	3795	3695

Source: adapted from unpublished information, Bureau of Land Management, Utah State Office (April 1983).

Table 3.3 Annual Construction and Operation Manpower Requirements for the Unitized Development Scenario

Project	Type of Development	Cumulative Production (bbls/day)	Phase	Annual Manpower Requirement																				
				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Unitized Development	Surface	50,000	Construction	10	10	10	10	10	10	10	10	10	375	475	475	475	475	475	475	320	320	320	320	100	–
			Operation	–	–	–	–	–	–	–	–	–	175	400	670	1160	1170	1180	1295	1705	1825	1925	2465	2465	2465
Total Unitized Development		50,000		10	10	10	10	10	10	10	10	10	550	875	1145	1635	1645	1655	1770	2025	2145	2245	2785	2565	2465

Source: adapted from unpublished information, Bureau of Land Management, Utah State Office (April 1983).

4 SOCIOECONOMIC IMPACT ANALYSIS OF THREE TAR SANDS DEVELOPMENT SCENARIOS

The socioeconomic impacts of the proposed tar sands developments in the Sunnyside STSA are analyzed in this section. Three different scenarios of proposed commercial development are evaluated for their potential impacts. These scenarios are based on the manpower profiles described in Sec. 3. The impacts from the proposed development of the Sunnyside STSA region are presented for the area as a whole, each of the two counties, and, in the case of population and households, CCDs and communities. Projections are included for the window years 1985, 1990, 1995, 2000, and 2005.

The first section, Sec. 4.1, presents a summary of the areawide impact on all the socioeconomic development factors -- population, employment, income, and infrastructure. Section 4.2 then addresses the impacts on the socioeconomic environment of each of the two counties (Carbon and Emery) and the affected CCDs and communities. In each section the potential impacts of the three scenarios are clearly distinguished.

4.1 SUMMARY OF AREAWIDE IMPACTS BY SOCIOECONOMIC DEVELOPMENT CATEGORY

This section contains a summary of the areawide socioeconomic impacts that would potentially occur as a result of the tar sands developments in the Sunnyside STSA. Two important assumptions underlie these impact projections. The first assumption is that the baseline projections (described in Sec. 2) would accurately reflect the socioeconomic composition of the counties in the time period under study. The second assumption is that the manpower requirements of the tar sands projects (described in Sec. 3) would not change. Given these two assumptions, the following analysis is based on the difference between the baseline projections and the projected impacts of the tar sands projects.

Each of the three scenarios is discussed separately; Sec. 4.1.1 contains the projected impacts under the proposed action scenario; 4.1.2 discusses the partial conversion scenario; and 4.1.3 analyzes the potential impact under the unitized development scenario.

4.1.1 Proposed Action Development Scenario

The projected impacts of the proposed action tar sands development scenario on the two-county area are discussed in this section. These socioeconomic impacts by development category and window year are presented in Table 4.1; all of the projections are presented as a change from the baseline projections for each window year. Table 4.2 indicates the projected impact on areawide income by sector. A discussion of the impacts by category follows.

Table 4.1 Summary of Areawide Socioeconomic Impacts, by Category and Window Year, for the Proposed Action Development Scenario

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985–2005	1985–1995	1995–2005
Population Growth								
Total	85	12,740	16,575	19,984	23,612	277.79	69.44	3.60
School-age	16	2,614	3,891	5,643	7,128	445.50	73.22	6.24
Retirement-age	0	280	523	690	794	–[b]	–[b]	4.26
Employment Growth (no. of jobs)	41	6,363	7,623	8,482	9,709	236.81	68.63	2.45
Household Growth	31	4,583	5,296	5,809	6,653	214.61	67.21	2.31
Infrastructure Requirements								
Housing								
Single-family units	18	2,750	3,178	3,486	3,992	221.78	67.76	2.31
Multifamily units	5	687	794	871	998	199.60	65.99	2.31
Mobile homes	8	1,146	1,324	1,452	1,663	207.88	66.68	2.31
Education								
Students	16	2,614	3,891	5,643	7,128	445.50	73.22	6.24
Classrooms	2	105	156	226	285	142.50	54.60	6.21
Teachers	2	105	156	226	285	142.50	54.60	6.21
Health Care								
Hospital beds								
General care	2	25	33	40	47	23.50	32.36	3.60
Long-term care	0	11	21	28	32	–[b]	–[b]	4.30
Medical personnel								
Doctors	2	8	10	12	14	7.00	17.46	3.42
Dentists	2	7	8	10	12	6.00	14.87	4.14
Nurses	2	22	28	34	41	20.50	30.20	3.89
Public health nurses	2	3	4	5	5	2.50	7.18	2.26
Mental health care								
Clinical psychologists	2	2	2	2	2	1.00	0	0
Mental health workers	2	2	3	3	3	1.50	4.14	0
Public Safety								
Law enforcement								
Police officers	2	25	33	40	47	23.50	32.36	3.60
Patrol cars	2	25	33	40	47	23.50	32.36	3.60
Jail space (sq ft)	43	6,371	8,288	9,992	11,806	274.56	69.24	3.60
Juvenile holding cells	2	3	3	3	4	2.00	4.14	2.92
Fire Protection								
Fire hydrant flow (gpm)/duration (hr)[c]								
Emergency Medical Service								
Ambulances	2	3	4	5	5	2.50	7.18	2.26
Emergency medical technicians	14	21	28	35	35	2.50	7.18	2.26
Utility Service Demands								
Water system								
Connections	28	4,110	5,347	6,447	7,618	272.07	69.08	3.60
Supply (10^6 gal/d)	0.05	6.58	8.55	10.32	12.19	243.80	67.22	3.61
Storage (10^6 gal/d)	0.03	3.29	4.28	5.16	6.10	203.33	64.22	3.61
Treatment (10^6 gal/d)	0.05	6.58	8.55	10.32	12.19	243.80	67.22	3.61
Sewage system (10^6 gal/d)	0.02	1.27	1.66	2.00	2.36	118.00	55.56	3.58
Solid waste[d]								

Table 4.1 (Cont'd)

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-2005	1985-1995	1995-2005
Other Services								
Parks (acres)	2	76	99	120	142	71.00	47.73	3.67
Libraries								
Books	170	25,480	33,150	39,968	47,224	277.79	69.44	3.60
Space (sq ft)	43	6,371	8,288	9,992	11,806	274.56	69.24	3.60

[a]Computed as ratio between 1985 and 2005.

[b]Undefined.

[c]Fire protection measured in fire hydrant flow (gpm)/duration (hr) cannot be aggregated across the affected counties. See Tables 4.20 and 4.21 for county-specific detail.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid-waste disposal impacts could not be determined.

The population of the region is projected to grow from 85 above the baseline in 1985 to 23,612 above it in 2005, as a result of the proposed action scenario. School-age population is expected to grow at approximately the same rate, as both categories increase by about 70% annually during the first 10 years of this scenario. From 1995-2005, all three population divisions (total, school-age, and retirement-age) are forecast to increase over the baseline at a slower rate: total population would increase by more than 40%, school-age population would grow by more than 80%, and retirement-age population would grow by more than 50%. These changes represent average annual increases of less than 7%.

Under the proposed action scenario, total areawide employment is expected to increase in much the same manner as population. After it would realize tremendous growth from 1985 to 1995 (average annual increases of 68.63%), employment is projected to rise by less than 3% annually over the remaining 10 years under study. The proposed action scenario is forecast to result in total regional employment growth of 9,709 by the year 2005.

The number of new households is also expected to grow rapidly from 1985 to 1995 and then at a slower rate as a result of the proposed action scenario. The number of new households is projected to rise from 31 in 1985 to 5,296 in 1995 -- an increase of 170 times. Over the following 10 years, however, the number of households is expected to increase by 26%, to 6,653 additional households in 2005.

The demand for housing of all forms follows the same trends as growth in the number of new households. Single-family housing is still expected to be the dominant form of housing through the scenario development period, and would account for 3,992 of the 6,653 additional units projected for the year

2005. In this same year, there are projected to be 1,663 additional mobile homes and 998 additional multifamily units. These figures for 2005 represent increases of about 200 times or more from the projected 1985 level. The standard for housing distribution remains constant throughout the period, and is as follows: 60% single-family units, 25% mobile homes, and 15% multifamily units.

Demands imposed on the education system by the proposed action scenario are expected to increase at the same rate as those impact categories already analyzed. The number of additional students would increase 445 times over the 1985 level. Classrooms and teachers would increase at a substantial but lesser rate; the number of classrooms and teachers is projected to increase by nearly 55% annually from 1985 to 1995, and by 6.21% annually thereafter. The rate of increase for students, teachers, and classrooms over the last 10 years would maintain the community standards of student-teacher proportions.

Health care services would not increase as rapidly as most other categories as a result of the tar sands projects included in the proposed action scenario. The number of general care hospital beds projected to be required due to these projects would rise by more than 32% annually from 1985 to 1995, and by 3.6% to 4.3% annually thereafter for general care and long-term care hospital beds. Lesser increases are projected in the number of medical personnel. The number of nurses would increase the most, rising from two above the baseline in 1985 to 41 above it in 2005, representing more than a twentyfold increase. Mental health care would undergo little change over the 20-year period as a result of the scenario developments.

Increases projected in public safety are greater than those projected in health care services. The number of officers and patrol cars would each rise to a level 47 above the baseline in 2005. This is representative of a 32.36% yearly increase from 1985 to 1995, and a 3.6% yearly increase thereafter. The amount of jail space is projected to increase by 69.24% annually during the first 10 years, and by 3.6% annually thereafter. The number of ambulances and emergency medical technicians would increase by 150% over the period; a much slower rate of increase than in most of the other services previously discussed.

All utility services and library services would be required to increase at approximately the same rate as a result of the proposed action scenario. Increases in all of these services are projected to rise by at least 55% annually from 1985 to 1995, and by 3.6% annually from 1995 to 2005. Park services are expected to increase at a slower rate, only 47.73% annually from 1985 to 1995 and 3.67% annually from 1995 to 2005.

Areawide Impact on Total Wage and Personal Income

The total areawide wage and personal income effects of the scenario are presented in Table 4.2. The wage and income data are presented by economic

Table 4.2 Total Areawide Wage and Personal Income Impact Projections, by Economic Sector, as a Result of the Proposed Action Development Scenario[a]

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Mining							
Average monthly wage (1980 $)	2,157	2,349	2,559	2,787	3,036	1.72	1.72
Change from baseline							
Number of employees	0	1,481	3,123	4,160	4,921	-[b]	4.65
Total wage payment (1980 $)	0	3,478,869	7,991,757	11,593,920	14,940,156	-[b]	6.46
Construction							
Average monthly wage (1980 $)	2,625	2,859	3,114	3,367	3,695	1.72	1.73
Change from baseline							
Number of employees	27	2,650	1,495	532	251	49.39	-16.34
Total wage payment (1980 $)	70,875	7,576,350	4,655,430	1,791,244	927,445	51.97	-14.90
Manufacturing							
Average monthly wage (1980 $)	893	973	1,060	1,154	1,257	1.73	1.72
Change from baseline							
Number of employees	0	45	54	68	79	-[b]	3.88
Total wage payment (1980 $)	0	43,785	57,240	78,472	99,303	-[b]	5.66
Transportation, Communications, and Utilities							
Average monthly wage (1980 $)	1,879	2,047	2,296	2,501	2,724	2.02	1.72
Change from baseline							
Number of employees	0	102	137	169	202	-[b]	3.96
Total wage payment (1980 $)	0	208,794	314,552	422,669	550,248	-[b]	5.75
Wholesale and Retail Trade							
Average monthly wage (1980 $)	844	919	1,002	1,091	1,188	1.73	1.72
Change from baseline							
Number of employees	4	585	774	946	1,122	69.30	3.78
Total wage payment (1980 $)	3,376	537,615	775,548	1,032,086	1,332,936	72.24	5.57
Finance, Insurance, and Real Estate							
Average monthly wage (1980 $)	925	1,007	1,097	1,195	1,302	1.72	1.73
Change from baseline							
Number of employees	0	88	119	150	178	-[b]	4.11
Total wage payment (1980 $)	0	88,616	130,543	179,250	231,756	-[b]	5.91
Services							
Average monthly wage (1980 $)	767	835	910	991	1,079	1.72	1.72
Change from baseline							
Number of employees	3	382	525	666	790	67.61	4.17
Total wage payment (1980 $)	2,301	318,970	477,750	660,006	852,410	70.50	5.96
Government							
Average monthly wage (1980 $)	931	1,014	1,144	1,246	1,357	2.08	1.72
Change from baseline							
Number of employees	4	622	855	1,127	1,379	71.00	4.90
Total wage payment (1980 $)	3,724	630,708	978,120	1,404,242	1,871,303	74.56	6.70
Nonfarm Proprietors (NFP)							
Average monthly wage (1980 $)	1,230	1,340	1,459	1,590	1,731	1.72	1.72
Change from baseline							
Number of employees	3	408	541	664	787	68.12	3.82
Total wage payment (1980 $)	3,690	546,720	789,319	1,055,760	1,362,297	71.01	5.61
Other Labor Income (OLI)							
Average monthly wage (1980 $)	106	115	126	137	149	1.74	1.69
Change from baseline							
Labor force	41	6,363	7,623	8,482	9,709	68.63	2.45
Total OLI (1980 $)	4,346	731,745	960,498	1,162,034	1,446,641	71.57	4.18

Table 4.2 (Cont'd)

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Average property income (1980 $)	141	156	170	185	202	1.89	1.74
Population	85	12,740	16,575	19,984	23,612	69.44	3.60
Total property income (1980 $)	11,985	1,987,440	2,817,750	3,697,040	4,769,624	72.63	5.40
Total monthly personal income (1980 $)	100,297	16,149,612	19,948,507	23,076,723	28,384,119	69.77	3.59
Average monthly per capita income (1980 $)	1,180	1,268	1,204	1,155	1,202	0.20	-0.02

[a]The number of employees by economic sector presented in this table may not equal the total economic sector employment presented in Tables 4.12 and 4.13 because these personal income projections may include communities that are not in the critical impact area (i.e., communities that do not satisfy the 5% growth criteria).

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

sector and income category. All sectors were assumed to have an approximate annual increase in monthly wages of 1.72% unless otherwise noted. Furthermore, wages in all sectors, unless identified, would increase by 40% over the 20-year period.

Table 4.2 shows that the highest average monthly wage in the economic sectors would be the $3,695 paid to contract construction workers in 2005. Due to the projected decrease in employment growth, however, the total wage paid in 2005 as a result of the tar sands projects would be almost 90% less than that paid in 1990 ($927,445 in 2005 compared to $7,576,350 in 1990). The greatest growth in total wage payment in 2005 would be in mining, where the 4,921 additional employees would receive a total of $14,940,156. The next largest amount of income growth would occur in the total property income category, with a figure of more than $4.7 million above the baseline in 2005.

Total wage payment in wholesale and retail trade, nonfarm proprietors, government, and other labor income would be between $1 million and $2 million over the baseline in each sector. The average monthly wage paid in government would increase by 2.08% annually from 1985 to 1995 -- the highest rate of increase for any sector. Transportation, communications, and utilities would also have an annual increase in monthly wages greater than 2% annually during this period.

The total wage payment in the finance, insurance, and real estate sector; the transportation, communications, and utilities sector; the manufacturing sector; the construction sector; and the services sector would each be less than $1 million in 2005.

In all sectors, the fastest growth in total regional wage is realized during the 1985-1995 period. These gains would be due predominantly to the increased employment in the region.

4.1.2 Partial Conversion Development Scenario

The projected socioeconomic impacts of the partial conversion development scenario in the Sunnyside STSA are described in this section. These impacts are presented by category and window year in Table 4.3. All of these projections are presented as a change from the baseline projections for each window year. Table 4.4 indicates the projected impact on areawide income by sector. A discussion of the areawide impact of this scenario follows.

Total population in the area under study is projected to rise from 69 above the baseline in 1985 to 17,847 above it in 2005, as a result of the tar sands projects incorporated in the partial conversion scenario. School-age population would undergo the same dramatic growth, rising to 5,197 above the baseline in 2005, a level almost 400 times the school-age population projected for 1985. The greatest growth for each of these population categories would occur between 1985 to 1995, when annual increases are projected to surpass 60%. Slower rates of change would occur from 1995 to 2005 in these two population categories and also in retirement-age population, as annual increases would drop below 10%.

Areawide employment is also expected to experience rapid increases as a result of the partial conversion scenario, especially from 1985 to 1995. During this period, employment is projected to increase by 62.05% each year, compared to a rate of only 5.66% annually between 1995 and 2005. By 2005, employment due to the tar sands projects included in the partial conversion scenario is expected to reach a level 7,363 above the baseline.

The number of households would also grow at a very substantial rate. In 2005, there are expected to be 5,053 more households as a result of the tar sands developments than the baseline projections would predict. From 25 households over the baseline in 1985, the number of households would increase by 61.54% annually through 1995, and then increase by only 5.26% each year through the end of the study period.

The growth in the demand for housing would follow the same pattern as those development categories already discussed. Rapid growth in housing demand would occur during the first 10 years (around 60% each year) followed by slower growth thereafter (5.27% annually, 1995-2005). Single-family housing would remain the dominant form, reaching a level 3,032 above the baseline in 2005. Mobile homes (1,264 above the baseline in 2005) and multi-family units (759 above in 2005) are projected to increase at a similar percentage rate, but at lower absolute levels.

Table 4.3 Summary of Areawide Socioeconomic Impacts, by Category and Window Year, for the Partial Conversion Development Scenario

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-2005	1985-1995	1995-2005
Population Growth								
Total	69	3,945	9,396	14,626	17,847	258.65	63.46	6.63
School-age	13	792	2,081	3,994	5,197	399.77	66.12	9.58
Retirement-age	0	83	273	488	573	-[b]	-[b]	7.70
Employment Growth (no. of jobs)	34	1,971	4,247	6,208	7,363	216.56	62.05	5.66
Household Growth	25	1,424	3,025	4,250	5,053	202.12	61.54	5.26
Infrastructure Requirements								
Housing								
Single-family units	16	856	1,815	2,551	3,032	189.50	60.50	5.27
Multifamily units	5	214	454	639	759	151.80	56.97	5.27
Mobile homes	7	356	757	1,063	1,264	180.57	59.73	5.26
Education								
Students	13	792	2,081	3,994	5,197	399.77	66.12	9.58
Classrooms	2	33	84	161	209	104.50	45.32	9.54
Teachers	2	33	84	161	209	104.50	45.32	9.54
Health Care								
Hospital beds								
General care	2	8	20	30	37	18.50	25.89	6.35
Long-term care	2	4	12	21	24	12.00	19.62	7.18
Medical personnel								
Doctors	2	4	7	9	11	5.50	13.35	4.62
Dentists	2	3	6	8	10	5.00	11.61	5.24
Nurses	2	7	17	26	31	15.50	23.86	6.19
Public health nurses	2	2	3	4	5	2.50	4.14	5.24
Mental health care								
Clinical psychologists	2	2	2	2	2	1.00	0	0
Mental health workers	2	2	2	3	3	1.50	0	4.14
Public Safety								
Law enforcement								
Police officers	2	8	20	30	37	18.50	25.89	6.35
Patrol cars	2	8	20	30	37	18.50	25.89	6.35
Jail space (sq ft)	35	1,973	4,699	7,314	8,924	254.97	63.23	6.62
Juvenile holding cells	2	2	3	3	4	2.00	4.14	2.92
Fire Protection								
Fire hydrant flow (gpm)/duration (hr)[c]								
Emergency Medical Service								
Ambulances	2	2	3	4	5	2.50	4.14	5.24
Emergency medical technicians	14	14	21	28	35	2.50	4.14	5.24
Utility Service Demands								
Water system								
Connections	24	1,274	3,032	4,719	5,758	239.92	62.24	6.62
Supply (10^6 gal/d)	0.04	2.04	4.85	7.55	9.21	230.25	61.57	6.61
Storage (10^6 gal/d)	0.03	1.02	2.43	3.77	4.61	153.67	55.18	6.66
Treatment (10^6 gal/d)	0.04	2.04	4.85	7.55	9.21	230.25	61.57	6.62
Sewage system (10^6 gal/d)	0.02	0.40	0.94	1.46	1.79	89.50	46.96	6.65
Solid waste[d]								

Table 4.3 (Cont'd)

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-2005	1985-1995	1995-2005
Other Services								
Parks (acres)	2	24	58	88	108	54.00	40.04	6.41
Libraries								
Books	138	7,890	18,792	29,252	35,694	258.65	63.46	6.63
Space (sq ft)	35	1,973	4,699	7,314	8,924	254.97	63.23	6.62

[a]Computed as ratio between 1985 and 2005.

[b]Undefined.

[c]Fire protection measured in fire hydrant flow (gpm)/duration (hr) cannot be aggregated across the affected counties. See Tables 4.22 and 4.23 for county-specific detail.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid-waste disposal impacts could not be determined.

Demands on the education system from the partial conversion scenario developments would again be similar to those already discussed. The number of students in the system is projected to increase much faster than the number of teachers or classrooms. The number of students would rise from a level 13 above the baseline in 1985 to a level 5,197 above it in 2005 — or to increase by a factor of 400. Teachers and classrooms would only increase by a factor of 105, i.e., the demand in 2005 for teachers and classrooms would be 105 times the 1985 levels, or greater than a 10,000% increase. This would be a growth of 25 students for each new teacher, an acceptable standard in the area.

Increases in health care produced by the partial conversion scenario would be less than those in other categories. Both general care and long-term hospital beds would increase by about 20% to 25% per year from 1985 to 1995. In all, there would be 61 more hospital beds in the area in 2005, compared to only four more in 1985. Lesser increases are expected in the number of medical personnel. However, the number of nurses would increase the most; from two above the baseline in 1985 to 31 above it in 2005. Little change is projected in the amount of mental health care available in the area.

Projected increases in public safety, due to the scenario developments, would be considerably greater than those described for health care services. The number of police officers and patrol cars would rise to a level of 37 above the baseline in 2005. The amount of jail space would expand at a much faster rate, increasing by a factor of 255 over the 20-year period. In 2005, there would be four more juvenile holding cells than the baseline would project. Increases of 150% would occur in the emergency medical services.

Utilities and library services would undergo identical increases. All of these services would expand by at least 60% per year from 1985 to 1995, and by 6.62% annually thereafter. This would result in service demand levels in 2005 being more than 200 times greater than the comparable 1985 levels. The amount of park land would increase at a slower rate, being expected to increase by a factor of 54 over the 20 years studied.

Areawide Impact on Total Wage and Personal Income

The total areawide wage and personal income effects of the scenario are presented in Table 4.4. The wage and income data are presented by economic sector and income category. All sectors were assumed to have an approximate annual increase in monthly wages of 1.72% unless otherwise noted. Furthermore, wages in all sectors, unless identified, would increase by 40% over the 20-year period.

Total wage payment under this scenario would follow trends identical to the impacts under the proposed action scenario. Mining would again experience the greatest growth, with a total wage of $11,245,344 above the baseline in 2005. Total property income would be more than $3 million above the baseline in 2005. Total wages between $1 million and $2 million above the baseline would be paid in each of the following sectors: wholesale and retail trade, government, nonfarm proprietors, and other labor income. Total wage payment would be less than $1 million above the baseline in each of the remaining sectors.

Again, the fastest growth would occur between 1985 and 1995 as a result of the growth in employment.

4.1.3 Unitized Development Scenario

The projected impacts of the unitized development scenario in the Sunnyside STSA are described in this section. These impacts are presented by socioeconomic category and window year in Table 4.5. All of these projections are presented as a change from the baseline projections for each window year. Table 4.6 shows the projected impact on areawide income by sector. A discussion of the areawide impact of this scenario follows.

The regional population is projected to be 12,138 above the baseline in 2005, compared to only 31 above it in 1985, as a result of the unitized development scenario. This would be an increase by a factor of almost 400. School-age population is expected to grow at an even faster rate; the increment above the baseline in 2005 (3,432) would be almost 700 times the increment in 1985 (5). Retirement-age population would not increase until 1995, but then would rise by 12.03% annually through 2005.

Total regional employment corresponding to the unitized development scenario is also expected to grow substantially over the 1985-2005 period.

Table 4.4 Total Areawide Wage and Personal Income Impact Projections, by Economic Sector, as a Result of the Partial Conversion Development Scenario[a]

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Mining							
Average monthly wage (1980 $)	2,157	2,349	2,559	2,787	3,036	1.72	1.72
Change from baseline							
Number of employees	0	459	2,028	3,009	3,704	-[b]	6.21
Total wage payment (1980 $)	0	1,078,191	5,189,652	8,386,083	11,245,344	-[b]	8.04
Construction							
Average monthly wage (1980 $)	2,625	2,859	3,114	3,367	3,695	1.72	1.73
Change from baseline							
Number of employees	23	822	449	410	215	34.60	7.10
Total wage payment (1980 $)	60,375	2,350,098	1,398,186	1,380,470	794,425	36.92	5.50
Manufacturing							
Average monthly wage (1980 $)	893	973	1,060	1,154	1,257	1.73	1.72
Change from baseline							
Number of employees	0	13	32	48	59	-[b]	6.31
Total wage payment (1980 $)	0	12,649	33,920	55,392	74,163	-[b]	8.14
Transportation, Communications, and Utilities							
Average monthly wage (1980 $)	1,879	2,047	2,296	2,501	2,724	2.02	1.72
Change from baseline							
Number of employees	1	31	80	124	151	54.99	6.56
Total wage payment (1980 $)	1,879	63,457	183,680	310,124	411,324	58.13	8.40
Wholesale and Retail Trade							
Average monthly wage (1980 $)	844	919	1,002	1,091	1,188	1.73	1.72
Change from baseline							
Number of employees	2	181	452	700	857	71.95	6.61
Total wage payment (1980 $)	1,688	166,339	452,904	763,700	1,018,116	74.93	8.44
Finance, Insurance, and Real Estate							
Average monthly wage (1980 $)	925	1,007	1,097	1,195	1,302	1.72	1.73
Change from baseline							
Number of employees	1	27	71	110	135	53.15	6.64
Total wage payment (1980 $)	925	27,189	77,887	131,450	175,770	55.79	8.48
Services							
Average monthly wage (1980 $)	767	835	910	991	1,079	1.72	1.72
Change from baseline							
Number of employees	2	119	315	493	606	65.85	6.76
Total wage payment (1980 $)	1,534	99,365	286,650	488,563	653,874	68.71	8.60
Government							
Average monthly wage (1980 $)	931	1,014	1,144	1,246	1,357	2.08	1.72
Change from baseline							
Number of employees	3	193	506	825	1,036	66.99	7.43
Total wage payment (1980 $)	2,793	195,702	578,864	1,027,950	1,405,852	70.47	9.28
Nonfarm Proprietors (NFP)							
Average monthly wage (1980 $)	1,230	1,340	1,459	1,590	1,731	1.72	1.72
Change from baseline							
Number of employees	2	126	314	489	600	65.80	6.69
Total wage payment (1980 $)	2,460	168,840	458,126	777,510	1,038,600	68.66	8.53
Other Labor Income (OLI)							
Average monthly OLI (1980 $)	106	115	126	137	149	1.74	1.69
Change from baseline							
Labor force	42	6,197	5,772	7,843	9,084	63.61	4.64
Total OLI (1980 $)	4,452	712,655	727,272	1,074,491	1,353,516	66.46	6.41

Table 4.4 (Cont'd)

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Average property income (1980 $)	141	156	170	185	202	1.89	1.74
Population	69	3,945	9,396	14,626	17,847	63.46	6.63
Total property income (1980 $)	9,729	615,420	1,597,320	2,705,810	3,605,094	66.55	8.48
Total monthly personal income (1980 $)	85,835	5,489,905	10,984,461	17,101,543	21,776,078	62.45	7.08
Average monthly per capita Income (1980 $)	1,244	1,392	1,169	1,169	1,220	-0.62	0.42

[a]The number of employees by economic sector presented in this table may not equal the total economic sector employment presented in Tables 4.14 and 4.15 because these personal income projections may include communities that are not in the critical impact area (i.e., communities that do not satisfy the 5% growth criteria).

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

Employment growth would increase by a factor of 329, from 15 additional workers in 1985 to 4,935 in 2005. This increase would be fastest from 1985 to 1995, when additional employment would increase by 62.9% each year; from 1995 to 2005 this growth rate would be 9.6% annually.

New scenario-related households are projected to grow by a factor of 303 during the period studied. In the year 2005, there would be 3,338 additional households compared to only 11 in 1985. This growth is fastest from 1985 to 1995, when the annual increase averages 61.59%, compared to an average annual increase of 9.6% for the period 1995-2005.

Demand in all forms of housing is expected to increase at a level comparable to the growth in households. Single-family units rise from seven additional units in 1985 to 2,004 additional units in 2005 under the scenario projections. This translates into a 60.66% average annual increase from 1985 to 1995, and a 9.59% yearly growth thereafter. Multifamily units and mobile homes undergo increases slightly less than this. In 2005, single-family units compose 60% of the additional housing stock; mobile houses 25%; and multi-family homes 15%.

Demands on the education system from the realization of the unitized development scenario are forecast to increase at a rate similar to those categories already discussed. The greatest growth would occur in the 1985-1995 period, when additional students would increase by 70% annually; additional teachers and classrooms would increase by 45% annually. In 1985, there would be only one each additional classroom and teacher, compared to 138 additional in each category in 2005.

Table 4.5 Summary of Areawide Socioeconomic Impacts, by Category and Window Year, for the Unitized Development Scenario

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-2005	1985-1995	1995-2005
Population Growth								
Total	31	47	4,148	8,791	12,138	391.55	63.17	11.33
School-age	5	9	1,000	2,409	3,432	686.40	69.86	13.12
Retirement-age	0	0	78	247	243	-[b]	-[b]	12.03
Employment Growth (no. of jobs)	15	23	1,974	3,799	4,935	329.00	62.90	9.60
Household Growth	11	17	1,335	2,493	3,338	303.46	61.59	9.60
Infrastructure Requirements								
Housing								
Single family units	7	11	802	1,497	2,004	286.29	60.66	9.59
Multifamily units	3	4	201	375	502	167.33	52.27	9.58
Mobile homes	4	5	334	624	836	209.00	55.66	9.61
Education								
Students	5	9	1,000	2,409	3,432	686.40	69.86	13.12
Classrooms	1	1	41	97	138	138.00	44.97	12.90
Teachers	1	1	41	97	138	138.00	44.97	12.90
Health Care								
Hospital beds								
General care	2	2	9	18	26	13.00	16.23	11.19
Long-term care	2	2	4	11	14	7.00	7.18	13.35
Medical personnel								
Doctors	2	2	4	6	8	4.00	7.18	7.18
Dentists	2	2	3	5	7	3.50	4.14	8.84
Nurses	2	2	8	16	21	10.50	14.87	10.13
Public health nurses	2	2	2	3	4	2.00	0	7.18
Mental health care								
Clinical psychologists	2	2	2	2	2	1.00	0	0
Mental health workers	2	2	2	2	3	1.50	0	4.14
Public Safety								
Law enforcement								
Police officers	2	2	9	18	26	13.00	16.23	11.19
Patrol cars	2	2	9	18	26	13.00	16.23	11.19
Jail space (sq ft)	16	24	2,074	4,396	6,069	379.31	62.66	11.33
Juvenile holding cells	2	2	2	3	3	1.50	0	4.14
Fire Protection								
Fire hydrant flow (gpm)/duration (hr)[c]								
Emergency Medical Service								
Ambulances	2	2	2	3	4	2.00	0	7.18
Emergency medical technicians	14	14	14	21	28	2.00	0	7.18
Utility Service Demands								
Water system								
Connections	11	15	1,339	2,837	3,917	356.09	61.64	11.33
Supply (10^6 gal/d)	0.02	0.03	2.15	4.54	6.27	313.50	59.64	11.30
Storage (10^6 gal/d)	0.02	0.02	1.07	2.27	3.14	157.00	48.88	11.37
Treatment (10^6 gal/d)	0.02	0.03	2.15	4.54	6.27	313.50	59.64	11.30
Sewage system (10^6 gal/d)	0.02	0.02	0.41	0.88	1.22	61.00	35.26	11.52
Solid waste[d]								

Table 4.5 (Cont'd)

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-2005	1985-1995	1995-2005
Other Services								
Parks (acres)	2	2	26	53	74	37.00	29.24	11.03
Libraries								
Books	62	92	8,296	17,582	24,276	391.55	63.17	11.33
Space (sq ft)	16	24	2,074	4,396	6,069	379.31	62.66	11.33

[a]Computed as ratio between 1985 and 2005.

[b]Undefined.

[c]Fire protection measured in fire hydrant flow (gpm)/duration (hr) cannot be aggregated across the affected counties. See Tables 4.24 and 4.25 for county-specific detail.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid-waste disposal impacts could not be determined.

Health care services responding to the unitized development scenario demands are projected to grow at a much slower rate than those impact categories already discussed. The number of additional hospital beds is expected to increase by a factor of 13 for general care and by a factor of seven for long-term care. Greater growth would occur for long-term care from 1995-2005, corresponding to the growth in retirement-age population. The demand for medical personnel is expected to increase only slightly compared to demand for most of the other services. Doctors, dentists, and public health nurses would all realize annual growth rates less than 10% throughout the period. The number of additional nurses would increase the most, from two additional in 1985 to 21 in 2005. Very little growth is projected in the amount of additional mental health services. Beds for long-term care, the number of dentists, the number of public health nurses, and the number of mental health workers would all experience the greatest growth from 1995 to 2005.

Greater scenario-specific increases are projected for each public safety category. Police officers and patrol cars would rise from two above the baseline in 1985 to 26 above it in 2005. Jail space would increase at a much greater rate; the projected change would be 62.66% annually from 1985 to 1995, and 11.33% annually thereafter. The number of juvenile holding cells would increase by 50% during the 20-year period. The number of additional emergency medical technicians is projected to double from 1985 to 2005; all of this growth would occur from 1995 to 2005. In 2005, there would be four additional ambulances and 28 additional emergency medical technicians required.

The tar sands activities of the unitized development scenario area would also increase the demand on utility services. All utilities are projected to undergo increases of more than 50% annually from 1985 to 1995,

and more than 11% annually thereafter. These increases, when expressed as a cumulative growth factor, would be more than 220 for each of the water and sewage categories.

Park land is forecast to expand to a total of 74 additional acres in 2005, from only two additional acres in 1985. Library services would increase at rates equivalent to the growth in utilities: 63% annually for 1985-1995 and 11.33% annually for 1995-2005.

Areawide Impact on Total Wage and Personal Income

The total areawide wage and personal income effects of the scenario are presented in Table 4.6. The wage and income data are presented by economic sector and income category. All sectors were assumed to have an approximate annual increase in monthly wages of 1.72% unless otherwise noted. Furthermore, wages in all sectors, unless identified, would increase by 40% over the 20-year period.

The total wage payment projected under the unitized development scenario would be similar to those impacts under the other two scenarios. The wage payment in mining would increase the most, with a total payment in 2005 projected to be $7,501,956. Total property income would also be more than $1 million above the baseline, at $2,451,876 in 2005.

All other sectors would have total wage payments less than $1 million above the projected baseline payment in 2005. Government ($959,399 in 2005) and other labor income ($744,404 in 2005) would experience the next largest amount of growth over the period.

The fastest growth in total wage payment is projected, again, to occur in the 1985-1995 period. This increase would be due mostly to the projected employment increases.

4.2 LOCAL SOCIOECONOMIC IMPACT ANALYSIS OF THE SUNNYSIDE STSA DEVELOPMENT SCENARIOS

The county-level socioeconomic impacts that would potentially arise from the development of the three tar sands project scenarios are addressed in this section. Two important assumptions underlie these projections of socioeconomic impacts. The first assumption is that the baseline projections (described in Sec. 2) would accurately reflect the socioeconomic composition of the counties in the time period under study. The second assumption is that the manpower requirements of each project and scenario (described in Sec. 3.1) would not change.

Given these two assumptions, the following county-level analysis is based on the difference between the baseline projections and the projected impacts of the tar sands development scenarios.

Table 4.6 Total Areawide Wage and Personal Income Impact Projections, by Economic Sector, as a Result of the Unitized Development Scenario[a]

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Mining							
Average monthly wage (1980 $)	2,157	2,349	2,559	2,787	3,036	1.72	1.72
Change from baseline							
Number of employees	0	0	673	1,710	2,471	-[b]	13.89
Total wage payment (1980 $)	0	0	1,722,207	4,765,770	7,501,956	-[b]	15.85
Construction							
Average monthly wage (1980 $)	2,625	2,859	3,114	3,367	3,695	1.72	1.73
Change from baseline							
Number of employees	10	10	517	413	130	48.37	-12.89
Total wage payment (1980 $)	26,250	28,590	1,609,938	1,390,571	480,350	50.93	-11.39
Manufacturing							
Average monthly wage (1980 $)	893	973	1,060	1,154	1,257	1.73	1.72
Change from baseline							
Number of employees	0	0	14	29	40	-[b]	11.07
Total wage payment (1980 $)	0	0	14,840	33,466	50,280	-[b]	12.98
Transportation, Communications, and Utilities							
Average monthly wage (1980 $)	1,879	2,047	2,296	2,501	2,724	2.02	1.72
Change from baseline							
Number of employees	0	1	35	74	103	-[b]	11.40
Total wage payment (1980 $)	0	2,047	80,360	185,074	280,572	-[b]	13.32
Wholesale and Retail Trade							
Average monthly wage (1980 $)	844	919	1,002	1,091	1,188	1.73	1.72
Change from baseline							
Number of employees	1	3	196	416	577	69.52	11.40
Total wage payment (1980 $)	844	2,757	196,392	453,856	685,476	72.46	13.31
Finance, Insurance, and Real Estate							
Average monthly wage (1980 $)	925	1,007	1,097	1,195	1,302	1.72	1.73
Change from baseline							
Number of employees	0	0	31	65	91	-[b]	11.37
Total wage payment (1980 $)	0	0	34,007	77,675	118,482	-[b]	13.29
Services							
Average monthly wage (1980 $)	767	835	910	991	1,079	1.72	1.72
Change from baseline							
Number of employees	1	3	137	295	409	63.56	11.56
Total wage payment (1980 $)	767	2,505	124,670	292,345	441,311	66.38	13.47
Government							
Average monthly wage (1980 $)	931	1,014	1,144	1,246	1,357	2.08	1.72
Change from baseline							
Number of employees	1	4	235	504	707	72.63	11.64
Total wage payment (1980 $)	931	4,056	268,840	627,984	959,399	76.22	13.57
Nonfarm Proprietors (NFP)							
Average monthly wage (1980 $)	1,230	1,340	1,459	1,590	1,731	1.72	1.72
Change from baseline							
Number of employees	1	2	137	292	406	63.56	11.48
Total wage payment (1980 $)	1,230	2,680	199,883	464,280	702,786	66.37	13.40
Other Labor Income (OLI)							
Average monthly OLI (1980 $)	106	115	126	137	149	1.74	1.69
Change from baseline							
Number of recipients	14	10	1,960	3,805	4,996	63.91	9.81
Total OLI (1980 $)	1,484	2,300	246,960	521,285	744,404	66.77	11.67

Table 4.6 (Cont'd)

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Average property income (1980 $)	141	156	170	185	202	1.89	1.74
Population	31	47	4,148	8,791	12,138	63.17	11.33
Total property income (1980 $)	4,371	7,332	705,160	1,626,335	2,451,876	66.25	13.27
Total monthly personal income (1980 $)	35,877	52,267	5,230,257	10,438,641	14,416,892	64.58	10.67
Average monthly per capita income (1980 $)	1,157	1,112	1,254	1,187	1,181	0.81	-0.60

[a]The number of employees by economic sector presented in this table may not equal the total economic sector employment presented in Tables 4.16 and 4.17 because these personal income projections may include communities that are not in the critical impact area (i.e., communities that do not satisfy the 5% growth criteria).

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

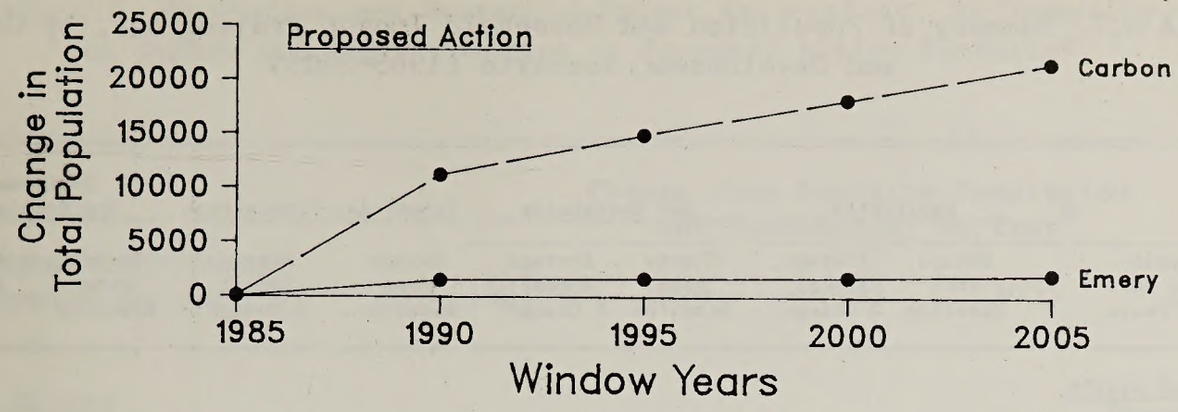
Impacts under each of the three development scenarios are discussed separately. Population, household, economic base, employment, and infrastructure impacts are discussed. In each instance, the impacts are presented in terms of the difference between the baseline projections and the scenario being discussed.

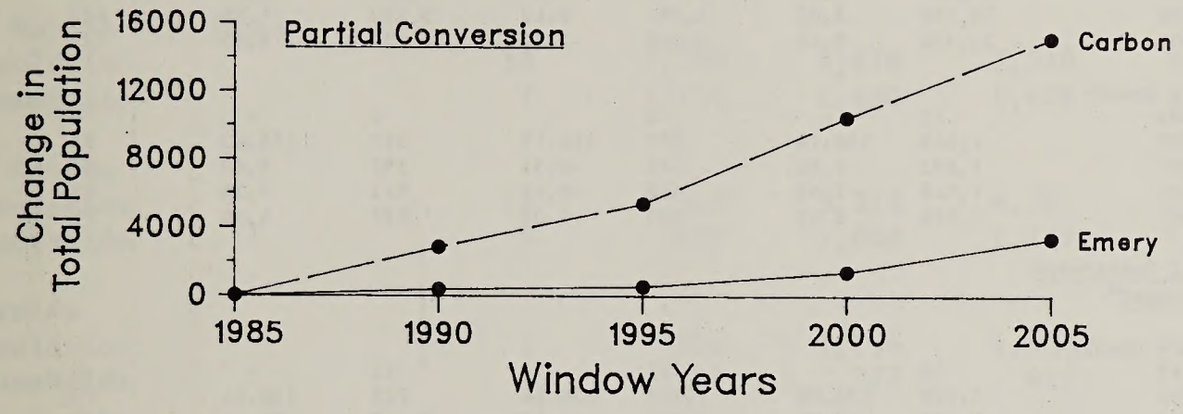
4.2.1 Population and Housing Impacts

Figure 4.1 illustrates the change in population that would occur in each county as a result of the three tar sands development scenarios. A summary of the population and household impacts in each county by scenario is presented in Table 4.7. Details of the population and household impacts by CCD and community are shown in Tables 4.8-4.10 for each scenario. Only those CCDs where significant changes would occur are enumerated in these tables, but all CCDs are included in the county totals.

Proposed Action Development Scenario

Population growth would occur in Carbon County throughout the period; in Emery County, population is forecast to fluctuate from year to year. Both counties would also experience these vacillations in the number of new households during this timeframe. Data are shown in Tables 4.7 and 4.8. Details of the county trends are described below.





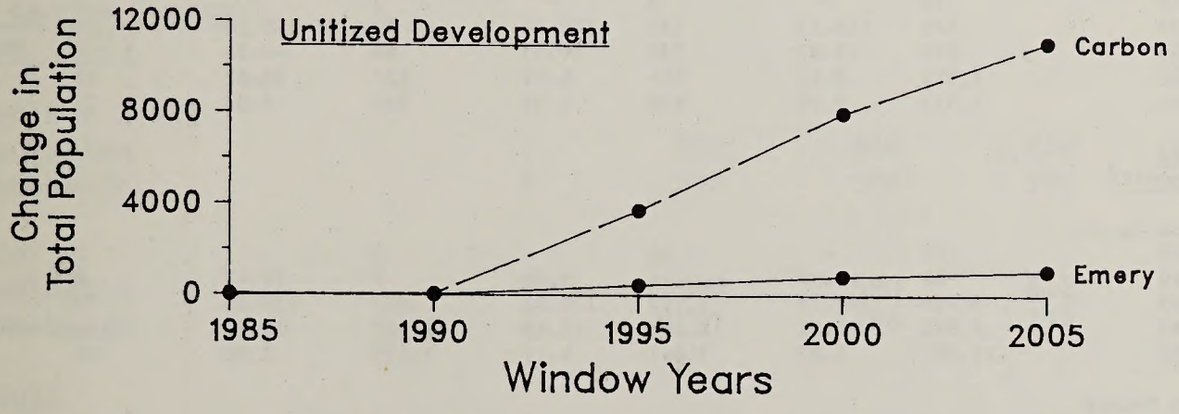


Fig. 4.1 Change in Population by County Due to the Three Sunnyside STSA Scenarios

Table 4.7 Summary of Population and Household Impact Projections, by County and Development Scenario (1985-2005)

Scenario, County, and Window Years	Population		New Households		School-Age Population		Retirement-Age Population	
	Change from Baseline	Average Annual % Change[a]	Change from Baseline	Average Annual % Change[a]	Change from Baseline	Average Annual % Change[a]	Change from Baseline	Average Annual % Change[a]
Proposed Action Development[b]								
Carbon County								
1985	73	-	27	-	14	-	0	-
1990	11,197	173.63	4,028	172.11	2,297	177.34	246	c
1995	14,883	5.86	4,755	3.37	3,494	8.75	470	13.82
2000	18,166	4.07	5,281	2.12	5,130	7.98	627	5.93
2005	21,536	3.46	6,068	2.82	6,501	4.85	724	2.92
Emery County								
1985	12	-	4	-	2	-	0	-
1990	1,543	164.14	555	168.19	317	175.43	34	c
1995	1,692	1.86	541	-0.51	397	4.60	53	9.29
2000	1,818	1.45	528	-0.49	513	5.26	63	3.52
2005	2,076	2.69	585	2.07	627	4.10	70	2.13
Partial Conversion Development[d]								
Carbon County								
1985	59	-	21	-	11	-	0	-
1990	3,470	125.89	1,253	126.54	712	130.26	75	c
1995	8,522	19.72	2,740	16.94	2,017	23.15	265	28.72
2000	13,302	9.31	3,856	7.07	3,767	13.31	460	11.66
2005	16,294	4.14	4,601	3.60	4,916	5.47	542	3.34
Emery County								
1985	10	-	3	-	2	-	0	-
1990	476	116.53	172	124.74	80	109.13	8	c
1995	875	12.95	285	10.63	64	-4.36	8	0
2000	1,323	8.62	394	6.69	227	28.82	28	28.47
2005	1,553	3.26	450	2.69	281	4.36	31	2.06
Unitized Development[d]								
Carbon County								
1985	25	-	10	-	5	-	0	-
1990	44	11.97	16	9.86	9	12.47	0	c
1995	3,709	142.75	1,192	136.83	957	154.29	75	c
2000	7,962	16.51	2,261	13.66	2,242	18.56	230	25.12
2005	11,071	6.82	3,041	6.11	3,219	7.50	322	6.96
Emery County								
1985	4	-	1	-	0	-	0	-
1990	4	0	1	0	0	c	0	c
1995	440	156.02	143	169.82	43	c	3	c
2000	829	13.51	231	10.07	167	31.17	17	41.47
2005	1,068	5.20	297	5.15	213	4.99	21	4.32

[a]Computed as average annual compound percent change from previous window year.

[b]Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

[c]Undefined.

[d]Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

Table 4.8 Population and Household Impact Projections, by Community, for Carbon and Emery Counties -- Proposed Action Scenario[a]

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year[b]				
	1985	1990	1995	2000	2005
Carbon County					
East Carbon Census County Division (CCD)					
East Carbon CCD Total					
Population	19	3,200	4,476	5,518	6,542
Households	7	1,151	1,430	1,604	1,843
East Carbon					
Population	14	2,368	3,312	4,083	4,842
Households	5	852	1,058	1,187	1,364
Sunnyside					
Population	5	832	1,164	1,435	1,700
Households	2	299	372	417	479
Unincorporated Areas					
Population	0	0	0	0	0
Helper Census County Division (CCD)					
Helper CCD Total					
Population	7	882	966	1,020	1,156
Households	3	318	308	297	326
Helper					
Population	4	530	580	612	694
Households	2	191	185	178	196
Scofield					
Population	0	0	0	0	0
Unincorporated Areas					
Population	3	352	386	408	462
Households	1	127	123	119	130

Table 4.8 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year[b]				
	1985	1990	1995	2000	2005
Price Census County Division (CCD)					
Price CCD Total					
Population	47	7,115	9,441	11,628	13,838
Households	17	2,559	3,017	3,380	3,899
Price					
Population	31	4,625	6,137	7,558	8,995
Households	11	1,664	1,961	2,197	2,534
Wellington					
Population	8	1,280	1,699	2,093	2,491
Households	3	460	543	608	702
Hiawatha					
Population	0	0	0	0	0
Unincorporated Areas					
Population	8	1,210	1,605	1,977	2,352
Households	3	435	513	575	663
Emery County[c]					
Castle Dale-Huntington Census County Division (CCD)					
Castle Dale-Huntington CCD Total					
Population	8	1,069	1,252	1,406	1,623
Households	3	385	400	408	457
Castle Dale					
Population	4	374	437	492	568
Households	1	136	140	143	160
Cleveland					
Population	0	66	75	85	97
Households	0	23	24	24	28
Elmo					
Population	0	42	51	57	65
Households	0	15	16	17	18

Table 4.8 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year[b]				
	1985	1990	1995	2000	2005
Huntington					
Population	2	267	313	351	406
Households	1	96	100	102	114
Orangeville					
Population	2	267	313	351	406
Households	1	96	100	102	114
Unincorporated Areas					
Population	0	53	63	70	81
Households	0	19	20	20	23
Green River Census County Division (CCD)					
Green River CCD Total					
Population	4	462	422	389	423
Households	1	167	135	113	119
Green River					
Population	3	397	363	335	363
Households	1	144	116	97	102
Unincorporated Areas					
Population	1	65	59	54	60
Households	0	23	19	16	17

[a]Only those census county divisions (CCDs) and communities which satisfied the 5% per year growth criterion are of interest and included in this table. All CCDs and communities are included in the county totals (Table 4.7).

[b]Totals may not add due to rounding.

[c]Emery-Ferron CCD impact projections were not significant.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

Carbon County. Carbon County is projected to experience the greatest growth due to the proposed action scenario (see Fig. 4.1). Population would reach a total 21,536 above the baseline in 2005, compared to only 73 above it in 1985. The fastest growth is expected to occur between 1985 and 1990, when annual increases average 173.63%. A similar rate of increase is forecast for this period in terms of school-age population and households. All population categories would realize substantially lower growth rates after 1990. The additional retirement-age population would grow from 0 in 1985 to 724 in 2005.

The greatest proportion of the population growth would occur in the Price CCD, where the population would grow from an additional 47 people in 1985 to an additional 13,838 in 2005. The city of Price would account for almost two-thirds of this growth, as population would rise to 8,995 above the baseline in 2005. Wellington and the unincorporated areas would account for equal amounts of growth, reaching population levels of 2,491 and 2,352 above the baseline, respectively, in 2005. The city of East Carbon would compose almost three-fourths of the total population growth in the East Carbon CCD, accounting for 4,842 of the total growth of 6,542 in 2005. The Helper CCD is projected to be the slowest growing area, as population would rise to only 1,156 above the baseline in 2005. The city of Helper and the unincorporated areas would be the locations for all of this projected population growth.

Throughout the county, the number of households would increase for this 20-year period. From 1985 to 1990 the annual growth rate is projected to be 172%, followed by a much slower growth rate, of about 2% to 3.5%, for the remainder of the period.

Emery County. Population in Emery County is forecast to follow the same trends as in Carbon County. The most rapid growth would occur between 1985 and 1990, as total population, households, and school-age population would increase by at least 160% annually. The next five-year period, however, would be characterized by an annual decline of households of 0.51%, and from 1995 to 2000 there would be a decline of 0.49%. Increases are projected to occur during the final five years of the period, so that, in all cases, the population level in 2005 represents the peak growth in the period. Total population would rise to 2,076 above the baseline in 2005, or less than one-tenth of the growth projected for Carbon County.

The Castle Dale-Huntington CCD is projected to undergo the greatest proportion of the growth forecast in the county, composing nearly 80% of the total county population growth in 2005. Castle Dale, Huntington, and Orangeville would combine to account for 85% of the 1,623 additional people in the CCD in 2005. The Green River CCD would be the smaller of the two CCDs in the county, contributing only 423 additional people to the total population growth in 2005. The town of Green River would account for 86% of this population growth projected for the CCD. In this CCD a drop in population is projected between 1990 and 2000.

Partial Conversion Development Scenario

Under this scenario, increases are projected for each population division and for households throughout the period under study. Carbon County would achieve much greater growth than Emery County; in 2005, there are expected to be 16,294 additional people in Carbon county, compared to only 1,078 in Emery. Details are presented in Tables 4.7 and 4.9.

Carbon County. Population in Carbon County is projected to rise from 59 above the baseline in 1985 to 16,294 above it in 2005. The most rapid growth would occur between 1985 and 1990, with annual increases expected to average 125.9%. Households and school-age population are expected to follow these same trends, but at reduced levels. Population and household growth is forecast to increase from 1995 through the end of the study period.

As before, the Price CCD is projected to experience the most population growth during the period 1985-2005. In 2005, there are projected to be 10,497 more people as a result of this tar sands development scenario in the Price CCD. Of these, 6,823 would be located in the city of Price, while Wellington and the unincorporated areas would account for the remainder. The East Carbon CCD is projected to have 4,924 additional people in 2005, with 3,644 of these located in the town of East Carbon. There would be no additional population in the unincorporated areas in this CCD. Helper CCD would again grow by the least amount; only 874 additional people are expected in 2005. The town of Helper would grow by 524, while the unincorporated areas would grow by 349. Scofield would experience no population growth under this scenario.

Household impacts would follow the same trends as population; Price CCD would experience the most impact; East Carbon CCD would be impacted moderately; and the Helper CCD would exhibit little change.

Emery County. Population in Emery County is projected to grow from 10 above the baseline in 1985 to 1,553 above it in 2005 as a result of the partial conversion development scenario. This increase is much less than the growth predicted in Carbon County. Households, school-age population, and total population all are projected to grow the fastest between 1985 and 1990, when annual rates of increase would be more than 100%. School-age population is the only category which would experience a decrease in population growth; from 1990 to 1995, it drops from 80 additional to 64 additional students.

The Castle Dale-Huntington CCD would easily be the fastest growing area, accounting for more than three-fourths of the population growth in the county. By 2005, it is projected that there will be 1,223 additional people in the Castle Dale-Huntington CCD: 428 in Castle Dale and 306 each in Huntington and Orangeville. Cleveland, Elmo, and the unincorporated areas would realize only slight population growth as a result of this scenario. The

Table 4.9 Population and Household Impact Projections, by Community, for Carbon and Emery Counties -- Partial Conversion Scenario[a]

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year[b]				
	1985	1990	1995	2000	2005
Carbon County					
East Carbon Census County Division (CCD)					
East Carbon CCD Total					
Population	15	991	2,558	4,013	4,924
Households	6	358	823	1,163	1,390
East Carbon					
Population	11	733	1,893	2,970	3,644
Households	4	265	609	861	1,029
Sunnyside					
Population	4	258	665	1,043	1,280
Households	2	93	214	302	361
Unincorporated Areas					
Population	0	0	0	0	0
Helper Census County Division (CCD)					
Helper CCD Total					
Population	5	273	508	748	874
Households	3	99	164	216	247
Helper					
Population	3	164	305	449	524
Households	2	59	98	130	148
Scofield					
Population	0	0	0	0	0
Unincorporated Areas					
Population	2	109	203	299	349
Households	1	39	65	87	99

Table 4.9 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year[b]				
	1985	1990	1995	2000	2005
Price Census County Division (CCD)					
Price CCD Total					
Population	38	2,206	5,455	8,541	10,497
Households	14	796	1,754	2,476	2,964
Price					
Population	25	1,434	3,546	5,552	6,823
Households	9	518	1,140	1,609	1,927
Wellington					
Population	7	397	982	1,537	1,889
Households	2	143	316	446	533
Hiawatha					
Population	0	0	0	0	0
Unincorporated Areas					
Population	7	375	927	1,452	1,785
Households	2	135	298	421	504
Emery County[c]					
Castle Dale-Huntington Census County Division (CCD)					
Castle Dale-Huntington CCD Total					
Population	6	332	677	1,024	1,223
Households	3	120	219	299	344
Castle Dale					
Population	2	116	237	359	428
Households	1	42	76	104	121
Cleveland					
Population	0	20	41	61	73
Households	0	7	13	18	20
Elmo					
Population	0	13	27	41	49
Households	0	5	9	12	14

Table 4.9 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year[b]				
	1985	1990	1995	2000	2005
Huntington					
Population	2	83	169	256	306
Households	1	30	55	75	86
Orangeville					
Population	2	83	169	256	306
Households	1	30	55	75	86
Unincorporated Areas					
Population	0	17	34	51	61
Households	0	6	11	15	17
Green River Census County Division (CCD)					
Green River CCD Total					
Population	3	142	186	279	306
Households	1	51	60	81	86
Green River					
Population	2	122	161	240	263
Households	1	44	52	70	74
Unincorporated Areas					
Population	1	20	26	39	43
Households	0	7	8	11	12

[a]Only those census county divisions (CCDs) and communities which satisfied the 5% per year growth criterion are of interest and included in this table. All CCDs and communities are included in the county totals (Table 4.7).

[b]Totals may not add due to rounding.

[c]Emery-Ferron CCD impact projections were not significant.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

Green River CCD is forecast to have 306 additional people in 2005, compared to only three in 1985. Most of this growth is expected to occur in the town of Green River, where population would rise to 263 above the baseline in 2005. Population in the unincorporated areas would increase by only 43 people over the period.

The number of households is expected to grow in the same manner as population. By the year 2005 in Emery County, there are projected to be 450 new households, with 344 of these in the Castle Dale-Huntington CCD, and 86 in the Green River CCD.

Unitized Development Scenario

Both Carbon and Emery counties are forecast to grow steadily throughout the period as a result of the unitized development scenario. Population growth in Carbon County would be more than 10 times the growth forecast for Emery County. Comparable differences are expected in new households, school-age population, and retirement-age population. These figures are compiled in Tables 4.7 and 4.10. A detailed county-level discussion follows.

Carbon County. Population in Carbon County is projected to increase from 25 above the baseline in 1985 to 11,071 above it in 2005. This would represent an increase in additional population by a factor of 442. The fastest growth is expected for the period 1990-1995, when population growth would increase by 142.75% each year as a result of the unitized development scenario. Similar changes are expected in the number of new households and in school-age population, where they would rise to levels of 3,041 and 3,219 above the baseline, respectively, in the year 2005. There would be no additional retirement-age population in 1985 or 1990 under the unitized development scenario.

As in the other two scenarios, the Price CCD would realize the most actual growth in population, rising to a level 7,156 above the baseline in 2005. This growth would be concentrated in the city of Price, where the additional population would reach 4,651 people in 2005. Wellington and the unincorporated areas are each expected to grow by more than 1,200 people during the 20-year period. The East Carbon CCD would also grow substantially, due to the tar sands activities proposed in the unitized development scenario. It is projected that there would be 3,326 additional people in this CCD by 2005, with 2,461 located in the town of East Carbon and 865 located in Sunnyside. The unincorporated areas would experience no population growth over the period. The Helper CCD would be impacted the least under this scenario, with the change in population growth expected to reach only 589 by the year 2005. This population growth would be divided between the town of Helper (353 additional people) and the unincorporated areas (236 additional people).

Table 4.10 Population and Household Impact Projections, by Community, for Carbon and Emery Counties — Unitized Development Scenario[a]

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year[b]				
	1985	1990	1995	2000	2005
Carbon County					
East Carbon Census County Division (CCD)					
East Carbon CCD Total					
Population	7	7	1,076	2,381	3,326
Households	3	3	346	676	913
East Carbon					
Population	5	5	796	1,762	2,461
Households	2	2	256	500	676
Sunnyside					
Population	2	2	280	619	865
Households	1	1	90	176	237
Unincorporated Areas					
Population	0	0	0	0	0
Helper Census County Division (CCD)					
Helper CCD Total					
Population	1	2	251	465	589
Households	1	1	81	132	162
Helper					
Population	1	2	151	279	353
Households	1	1	49	79	97
Scofield					
Population	0	0	0	0	0
Unincorporated Areas					
Population	0	0	100	186	236
Households	0	0	32	53	65

Table 4.10 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year[b]				
	1985	1990	1995	2000	2005
Price Census County Division (CCD)					
Price CCD Total					
Population	17	33	2,382	5,116	7,156
Households	6	12	766	1,453	1,966
Price					
Population	11	21	1,548	3,325	4,651
Households	4	8	498	944	1,278
Wellington					
Population	3	6	429	921	1,288
Households	1	2	138	262	354
Hiawatha					
Population	0	0	0	0	0
Unincorporated Areas					
Population	3	6	405	870	1,217
Households	1	2	130	247	334
Emery County[c]					
Castle Dale-Huntington Census County Division (CCD)					
Castle Dale-Huntington CCD Total					
Population	3	3	318	627	827
Households	0	0	103	179	227
Castle Dale					
Population	1	1	111	219	289
Households	0	0	36	62	79
Cleveland					
Population	0	0	19	38	50
Households	0	0	6	11	14
Elmo					
Population	0	0	13	25	33
Households	0	0	4	7	9

Table 4.10 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year[b]				
	1985	1990	1995	2000	2005
Huntington					
Population	1	1	80	157	207
Households	0	0	26	45	57
Orangeville					
Population	1	1	80	157	207
Households	0	0	26	45	57
Unincorporated Areas					
Population	0	0	16	31	41
Households	0	0	5	9	11
Green River Census County Division (CCD)					
Green River CCD Total					
Population	0	0	116	191	226
Households	0	0	37	54	62
Green River					
Population	0	0	100	164	194
Households	0	0	32	46	53
Unincorporated Areas					
Population	0	0	16	27	32
Households	0	0	5	8	9

[a]Only those census county divisions (CCDs) and communities which satisfied the 5% per year growth criterion are of interest and included in this table. All CCDs and communities are included in the county totals (Table 4.7).

[b]Totals may not add due to rounding.

[c]Emery-Ferron CCD impact projections were not significant.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

New households are projected to grow at rates that closely approximate those realized by the overall population. There are forecast to be 3,041 new households in the county in 2005, compared to 10 in 1985. These increases are distributed in the same way as the population, with 1,966 new households in the Price CCD, 913 in the East Carbon CCD, and 162 in the Helper CCD.

Emery County. The additional population growth projected for Emery County would reach 1,068 by the year 2005 as a result of the unitized development scenario. There would be no growth expected in population or new households between 1985 and 1990. Additionally, 1995 is the first year that any impact is expected for either school-age or retirement-age populations. The most rapid growth is projected to occur between 1990 and 1995, when population and new households are expected to increase by more than 150% annually. Steady but slower increases are projected to occur over the 1995-2005 period.

The Castle Dale-Huntington CCD is projected to have 827 additional people in 2005, or almost 78% of the total county population growth projected under the unitized development scenario. Population growth would be greatest in Castle Dale (with 289 additional people), and Huntington and Orangeville (with 207 additional people each). Cleveland, Elmo, and the unincorporated areas would each grow by 50 people or less. The Green River CCD is projected to grow by only 226 people by 2005 as a result of proposed tar sands activities under the unitized development scenario. This population growth would be greatest in the town of Green River, where 194 additional people are projected for the year 2005. Unincorporated areas would grow by only 32 people over the period.

New households would be concentrated in the areas of the greatest population growth. Of the 297 new households forecast for the county in the year 2005, 227 would be located in the Castle Dale-Huntington CCD and 62 in the Green River CCD.

4.2.2 Economic Base and Employment Impacts

This section describes the potential changes to the economic base of Carbon and Emery counties as a result of the tar sands developments proposed in the three Sunnyside STSA scenarios. The impacts resulting from each of the three scenarios are discussed separately. Employment growth by county and sector is assessed together with the projections of total personal income and per capita income.

Total Employment Impacts by Scenario and County

Table 4.11 presents the employment impacts by county which are projected to result under each development scenario. These impacts are illustrated graphically in Fig. 4.2. Impacts on employment resulting from the tar sands development scenarios are presented as a change from the baseline employment projections.

Proposed Action Development Scenario. Under this scenario, total employment growth in the region is projected to reach 9,709 in the year 2005. More than 96% of this growth is expected to occur in Carbon County, where additional employment is projected to rise from 41 in 1985 to 9,346 in 2005. The fastest growth would be realized between 1985 and 1995, when employment is projected to increase by 68.02% annually; the rate would become 2.43% annually from 1995 to 2005. Emery County is not expected to undergo

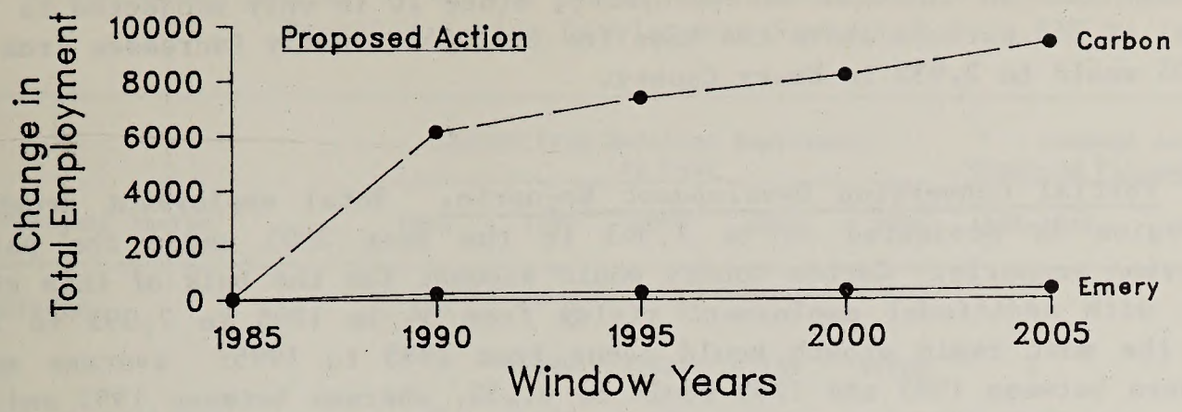
Table 4.11 Summary of Total Employment Impacts, by County, Resulting from Each Development Scenario

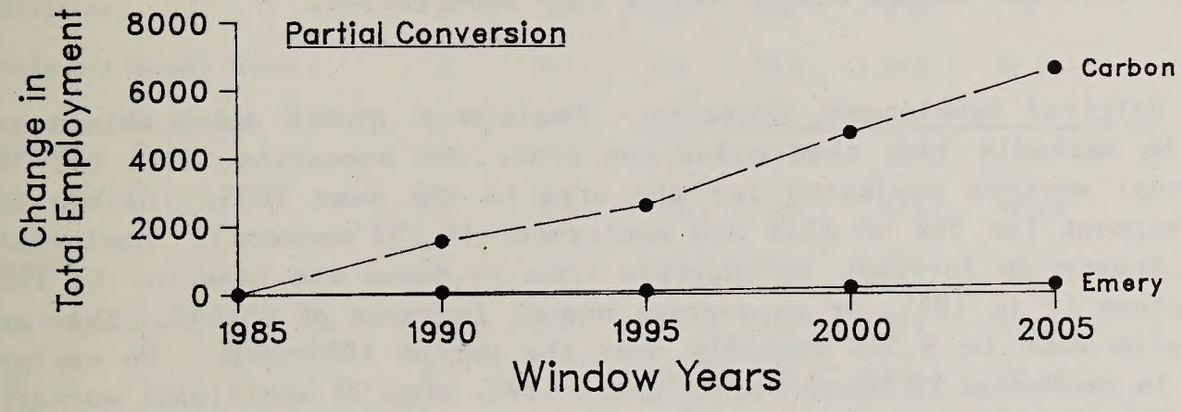
	Change from Baseline Employment, by Year (number of workers)					Average Annual Compound Percent Change	
Scenario and County	1985	1990	1995	2000	2005	1985-1995	1995-2005
Proposed Action Development[a]							
Carbon County	41	6,125	7,351	8,171	9,346	68.02	2.43
Emery County	0	238	272	311	363	b	2.93
Partial Conversion Development[c]							
Carbon County	34	1,898	4,104	5,983	7,093	61.50	5.62
Emery County	0	73	143	225	270	b	6.56
Unitized Development[c]							
Carbon County	14	23	1,904	3,655	4,752	63.44	9.58
Emery County	0	0	71	143	182	b	9.87

[a]Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

[b]Undefined.

[c]Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).





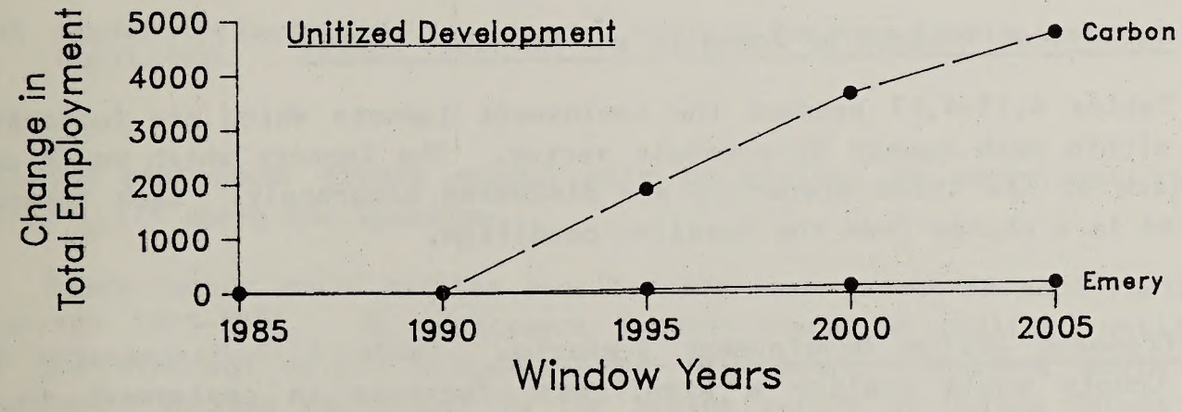


Fig. 4.2 Change in County Employment Levels Due to the Three Sunnyside STSA Development Scenarios

this same rate of increase in employment, since it is only projected to reach a level of 363 workers above the baseline in 2005. Yearly increases from 1995 to 2005 would be 2.93% in Emery County.

Partial Conversion Development Scenario. Total employment growth in the region is projected to be 7,363 in the year 2005 under the partial conversion scenario. Carbon County would account for the bulk of this growth (96%), with additional employment rising from 34 in 1985 to 7,093 in 2005. Again the most rapid growth would occur from 1985 to 1995: average annual increases between 1985 and 1995 would be 61.5%, whereas between 1995 and 2005 they would be 5.62%. Emery County would have no additional employment in 1985, but would have 270 additional workers in the year 2005. Over the last 10 years, the average annual rate of increase would be 6.56%, or slightly more than the rate for Carbon County during this same period.

Unitized Development Scenario. Employment growth under this scenario would be markedly less than under the other two scenarios, with only 4,934 additional workers projected for the area in the year 2005. Carbon County would account for 96% of this new employment (4,752 workers). Employment in Carbon County is forecast to increase from 14 above the baseline in 1985 to 1,904 above it in 1995, or an average annual increase of 63.44%. This growth would slow down to 9.58% annually over the period 1995-2005. No employment impact is projected in Emery County until 1995, when 71 additional workers are expected. By 2005, this growth would have reached 182 additional workers, resulting in an average annual increase of 9.87%.

Employment Impacts by Scenario and Economic Sector

Tables 4.12-4.17 present the employment impacts which are forecast to result within each county by economic sector. The impacts which would occur under each of the three scenarios are discussed separately. Each impact is presented is a change from the baseline condition.

Proposed Action Development Scenario. Table 4.12 illustrates that Carbon County would realize a significant increase in employment in all economic sectors except agriculture. Most of the employment growth is projected to occur in mining, where there would be 4,920 additional workers in 2005, compared to zero in 1985. Contract construction employment would peak at 2,636 above the baseline in 1990, and then would decrease to only 229 above the baseline in 2005. Employment in most other sectors is expected to increase considerably, especially in the period 1985-1995. During this timeframe, average annual increases in these sectors would be between 65% and 70%. In the following 10 years, these growth rates would drop to about 2.5% and 5% annually. In Carbon County, the government sector is projected to

Table 4.12 Changes in Carbon County Employment Resulting from the Proposed Action Development Scenario[a]

Economic Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	0	1,480	3,122	4,159	4,920	b	4.65
Contract Construction	27	2,636	1,478	513	229	49.22	-17.01
Manufacturing	0	40	51	63	75	b	3.93
Transportation, Communication, and Utilities	0	88	120	150	179	b	4.08
Wholesale and Retail Trade	4	527	709	875	1,040	67.83	3.91
Finance, Insurance, and Real Estate	0	81	112	142	168	b	4.14
Services	3	354	492	630	749	66.53	4.29
Government	4	563	785	1,041	1,275	69.54	4.97
Nonfarm Proprietors	3	356	482	598	711	66.19	3.96
Total	41	6,125	7,351	8,171	9,346	68.02	2.43

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

experience employment growth second only to mining, as employment in 2005 would be 1,275 above the baseline.

Emery County would realize considerably less growth in employment over the period 1985-2005. No employment impacts would be realized until 1990 under the proposed action scenario, and only scant increases would occur thereafter. Whereas employment in the mining sector of Carbon County would increase dramatically, there is projected to be only one additional miner in Emery County in 2005. Employment by government, trade, and nonfarm proprietors is expected to increase by the greatest amounts, reaching levels 104, 82, and 76 above the baseline, respectively, in 2005. All sectors except agriculture and mining are projected to increase by annual rates between 2% and 4% in the period 1995-2005. Details of these trends are presented in Table 4.13.

Table 4.13 Changes in Emery County Employment Resulting from the Proposed Action Development Scenario[a]

Economic Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	0	1	1	1	1	b	0
Contract Construction	0	14	17	19	22	b	2.61
Manufacturing	0	5	3	5	4	b	2.92
Transportation, Communication, and Utilities	0	14	17	19	23	b	3.07
Wholesale and Retail Trade	0	58	65	71	82	b	2.35
Finance, Insurance, and Real Estate	0	7	7	8	10	b	3.63
Services	0	28	33	36	41	b	2.19
Government	0	59	70	86	104	b	4.04
Nonfarm Proprietors	0	52	59	66	76	b	2.56
Total	0	238	272	311	363	b	2.93

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

Partial Conversion Development Scenario. Carbon County is projected to experience large increases in employment in almost all industrial sectors. Table 4.14 shows that mining would grow the most of all sectors, with 3,702 additional workers expected in 2005. No other sector would have increases of more than 1,000 in the 20-year period. Government and trade would have the second and third greatest additions in employment, respectively. Employment in government would increase from three above the baseline in 1985 to 970 above it in 2005; employment in trade would rise from two above the baseline in 1985 to 790 above it in 2005. Contract construction employment in Carbon County would peak at 817 in 1990, and then would decrease through the end of the period; at 198 above the baseline in 2005, however, a net increase would still be realized. Employment in most sectors would increase between 50% and 70% annually from 1985 to 1995. Annual increases for the period 1995-2005 would average between 5% and 7.5%, with the exception of contract construction, where the employment projections associated with the partial conversion scenario would decrease by 7.67% annually.

Table 4.14 Changes in Carbon County Employment Resulting from the Partial Conversion Development Scenario[a]

Economic Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	0	459	2,027	3,007	3,702	b	6.21
Contract Construction	23	817	440	396	198	34.33	-7.67
Manufacturing	0	12	30	46	56	b	6.44
Transportation, Communication, and Utilities	1	27	72	111	136	53.37	6.57
Wholesale and Retail Trade	2	163	417	644	790	70.57	6.60
Finance, Insurance, and Real Estate	1	25	67	104	128	52.27	6.69
Services	2	110	298	466	573	64.94	6.76
Government	3	175	470	769	970	65.77	7.51
Nonfarm Proprietors	2	110	283	440	540	64.09	6.67
Total	34	1,898	4,104	5,983	7,093	61.50	5.62

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

Emery County would again realize relatively small changes in employment, and would have no impact until 1990. Employment in the trade, government, and nonfarm proprietors sectors would grow the most relative to other sectors, but no sector would have employment increase by as much as 70 workers. Very small employment increases are projected to occur in mining, manufacturing, and finance, insurance, and real estate. From 1995 to 2005, average annual increases for each sector would be between 4.14% and 7.18%. Table 4.15 contains the details of these changes.

Unitized Development Scenario. Under this scenario, as in the other two, Carbon County would undergo the most employment growth in the mining sector. In the year 2005, more than half of the projected 4,752 workers in the county would be miners. Table 4.16 illustrates that the government and trade sectors would realize the second and third greatest employment increases; employment levels of 656 and 536 above the baseline would be

Table 4.15 Changes in Emery County Employment Resulting from the Partial Conversion Development Scenario[a]

Industry Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	0	0	1	2	2	b	7.18
Contract Construction	0	5	9	14	17	b	6.57
Manufacturing	0	1	2	2	3	b	4.14
Transportation, Communication, and Utilities	0	4	8	13	15	b	6.49
Wholesale and Retail Trade	0	18	35	56	67	b	6.71
Finance, Insurance, and Real Estate	0	2	4	6	7	b	5.76
Services	0	9	17	27	33	b	6.86
Government	0	18	36	56	66	b	6.25
Nonfarm Proprietors	0	16	31	49	60	b	6.83
Total	0	73	143	225	270	b	6.56

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

attained by these two sectors, respectively, in 2005. Annual increases from 1985 to 1995 would range from 48% to 71%, as all sectors are projected to experience increased employment. From 1995 to 2005, however, additional employment in contract construction is projected to decrease by 13.67% annually. Employment growth in all other sectors is expected to increase during this period by annual rates over 11%.

As before, Emery County is projected to experience little employment growth during the period 1985-2005. Table 4.17 indicates that no employment impacts from the tar sands activities under the unitized development scenario would be realized in any sector until 1995. After this time, employment in the government, trade, and nonfarm proprietors sectors would add more workers than the other economic sectors, attaining levels of 51, 41, and 39 above the baseline, respectively. The additional employment in Emery County as a whole in 2005 would constitute less than 4% of the total employment growth of the

Table 4.16 Changes in Carbon County Employment Resulting from the Unitized Development Scenario[a]

Economic Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	0	0	672	1,709	2,470	b	13.90
Contract Construction	10	10	513	404	118	48.26	-13.67
Manufacturing	0	0	13	27	38	b	11.32
Transportation, Communication, and Utilities	0	1	31	66	92	b	11.49
Wholesale and Retail Trade	1	3	179	383	536	68.00	11.59
Finance, Insurance, and Real Estate	0	0	29	62	87	b	11.61
Services	1	3	129	278	388	62.58	11.64
Government	1	4	216	464	656	71.18	11.75
Nonfarm Proprietors	1	2	122	262	367	61.67	11.64
Total	15	23	1,904	3,655	4,752	62.31	9.58

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

two-county area. From 1995 to 2005, this employment growth would translate into increases of between 7% and 12% per year.

Personal Income Impact Projections

The total personal income projections are presented by county and scenario in Table 4.18. The projections are based on a forecast of per capita income and population growth. Per capita income for the years 1985-2005 was derived by aggregating the average monthly wage levels by economic sector and assuming (1) that the personal income component would remain at the same proportion as the national level and (2) that the average annual rate of growth would remain constant.

Table 4.17 Changes in Emery County Employment Resulting from the Unitized Development Scenario[a]

Economic Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	0	0	1	1	1	b	0
Contract Construction	0	0	4	9	12	b	11.61
Manufacturing	0	0	1	2	2	b	7.18
Transportation, Communication, and Utilities	0	0	4	8	11	b	10.65
Wholesale and Retail Trade	0	0	17	33	41	b	9.20
Finance, Insurance, and Real Estate	0	0	2	3	4	b	7.18
Services	0	0	8	17	21	b	10.13
Government	0	0	19	40	51	b	10.38
Nonfarm Proprietors	0	0	15	30	39	b	10.02
Total	0	0	71	143	182	b	9.88

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

Proposed Action Development Scenario. The per capita income levels for the area are shown in the first line of Table 4.18. Per capita income under the proposed action development scenario is projected to increase from $14,160 in 1985 to $14,448 in 1995, and then decline to $14,424 in 2005. The annual rate of growth in the first 10 years would be 0.20%, with a 0.02% annual decline in the final 10 years.

In Carbon County, the total personal income generated by the proposed action scenario (measured as a change from the baseline income projections) is projected to increase at an annual rate of 70.60% between 1985 and 1995, and then grow by 3.75% annually thereafter. In 2005, total personal income in the county would be $310.64 million above the baseline.

Increases in personal income would be much smaller in Emery County. Total personal income is projected to reach a level $29.94 million above the baseline in 2005. The most rapid increase would occur between 1985 and 1995,

Table 4.18 Total Personal Income and Per Capita Income Projections by County and Development Scenario

County Population and Income Category	Income and Population Projections, by Scenario and Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Proposed Action Scenario[a]							
Per Capita Income (1980 $)	14,160	15,216	14,448	13,860	14,424	0.20	-0.02
Change from baseline, Carbon County							
Population	73	11,197	14,883	18,166	21,536	70.19	3.76
Total personal income (1980 $ x 10^6)	1.03	170.37	215.03	251.78	310.64	70.60	3.75
Change from baseline, Emery County							
Population	12	1,543	1,692	1,818	2,076	64.03	2.07
Total personal income (1980 $ x 10^6)	0.17	23.48	24.45	25.20	29.94	64.36	2.05
Partial Conversion Scenario[b]							
Per Capita Income (1980 $)	14,928	16,704	14,028	14,028	14,640	-0.62	-0.43
Change from baseline, Carbon County							
Population	59	3,469	8,521	13,303	16,294	64.42	6.70
Total personal income (1980 $ x 10^6)	0.88	57.95	119.53	186.61	238.54	63.40	7.15
Change from baseline, Emery County							
Population	210	476	875	1,323	1,553	15.34	5.90
Total personal income (1980 $ x 10^6)	3.13	7.95	12.27	18.56	22.74	14.64	6.36
Unitized Development Scenario[b]							
Per Capita Income (1980 $)	13,884	13,344	15,052	14,244	14,256	0.81	-0.54
Change from baseline, Carbon County							
Population	27	43	3,708	7,962	11,070	63.60	11.56
Total personal income (1980 $ x 10^6)	0.37	0.57	55.82	113.41	157.81	65.14	10.95
Change from baseline, Emery County							
Population	4	3	440	829	1,068	60.01	9.27
Total personal income (1980 $ x 10^6)	0.06	0.05	6.62	11.81	15.23	60.06	8.69

[a]Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

[b]Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (June 1983).

when total personal income is expected to rise by 64.36% annually. This growth rate drops to 2.05% yearly for the period 1995-2005.

Partial Conversion Development Scenario. Per capita income under this scenario is projected to fluctuate throughout the period. From an areawide level of $14,928 in 1985, per capita income is expected to rise to $16,704 in 1990, and then decrease to $14,640 in 2005. This represents a decrease of around 2% over the 20-year period. Details of these changes are shown in Table 4.18.

Carbon County is again forecast to undergo a very large upward change in total personal income. In 1985, the additional personal income, projected as a result of the tar sands projects proposed under the partial conversion scenario, would be $880,000. This income level would rise to $238.54 million in 2005. The annual rate of change would be 63.40% for the 1985-1995 period and 7.15% thereafter.

Emery County is anticipated to have a much smaller increase in total personal income. Total personal income is forecast to expand by 14.64% annually between 1985 and 1995 and then decline to 6.36% annually for the 1995-2005 period. The level of total personal income due to the partial conversion scenario developments would be $22.74 million in 2005.

Unitized Action Development Scenario. The areawide per capita income levels under the unitized action development scenario are presented in Table 4.18. Per capita income is projected to oscillate from window year to window year, reaching a maximum of $15,052 in 1995, and leveling off at $14,256 in 2005. The annual rate of increase from 1985 to 1995 would be 0.81%, with a 0.54% annual decrease over the period 1995-2005.

Total personal income in Carbon County, projected as a result of the tar sands activities planned under this scenario, would grow at a 65.14% annual rate between 1985 and 1995, and then slacken to an annual growth rate of 10.95% in the 1995-2005 period. The level of total personal income would be $370,000 above the baseline in 1985, and would rise to a level $157.81 million above it in 2005.

The change in total personal income in Emery County is projected to be much less than the change anticipated in Carbon County. In 1985, total personal income in Emery resulting from the tar sands projects would be $60,000. This additional income would increase to $15.23 million in 2005. The annual rate of change would be 60.6% during the 1985-1995 period, and 8.69% thereafter.

4.2.3 Public and Private Infrastructure Effects

In addition to the effects on population, employment, and income, the tar sands projects proposed for the Sunnyside STSA in the three scenarios would also have a significant impact on the public and private infrastructure of Carbon and Emery counties and their communities. The cumulative growth factors for infrastructure service demands are presented in Table 4.19 for

Table 4.19 Infrastructure Service Demand Growth Factors Corresponding to the Three Sunnyside Development Scenarios

Infrastructure Category	Cumulative Growth Factors by Scenario, 1985–2005[a]					
	Proposed Action		Partial Conversion		Unitized Development	
	Carbon County	Emery County	Carbon County	Emery County	Carbon County	Emery County
Housing Units						
Single family	227.56	175.50	197.29	135.00	304.17	179.00
Multifamily	227.50	88.00	172.75	68.00	228.50	45.00
Mobile homes	216.71	146.00	191.83	113.00	253.67	75.00
Education						
Students	464.36	313.50	446.91	140.50	643.80	b
Classrooms	260.00	25.00	197.00	12.00	129.00	b
Teachers	260.00	25.00	197.00	12.00	129.00	b
Health Care						
Hospital beds						
General care	43.00	4.00	33.00	4.00	23.00	3.00
Long-term care	b	b	22.00	2.00	13.00	1.00
Medical personnel						
Doctors	13.00	1.00	10.00	1.00	7.00	1.00
Dentists	11.00	1.00	9.00	1.00	6.00	1.00
Nurses	37.00	4.00	28.00	3.00	19.00	2.00
Public health nurses	4.00	1.00	4.00	1.00	3.00	1.00
Mental health care						
Clinical psychologists	1.00	1.00	1.00	1.00	1.00	1.00
Mental health workers	2.00	1.00	2.00	1.00	2.00	1.00
Public Safety						
Law enforcement						
Police officers	43.00	4.00	33.00	4.00	23.00	3.00
Patrol cars	43.00	4.00	33.00	4.00	23.00	3.00
Jail floor space	291.03	173.00	271.57	155.40	395.36	267.00
Juvenile holding cells	3.00	1.00	3.00	1.00	2.00	1.00
Fire Protection						
Fire hydrant flow (gpm)/ duration (hr)	4.50	1.50	4.00	1.25	3.00	1.00
Emergency Medical Service						
Ambulances	4.00	1.00	4.00	1.00	3.00	1.00
Emergency medical technicians	4.00	1.00	4.00	1.00	3.00	1.00
Utility Service Demands						
Water system						
Connections	289.50	167.50	262.85	125.25	396.89	172.50
Supply capacity	278.00	107.00	255.83	146.50	417.20	100.50
Storage capacity	278.00	54.00	255.83	146.00	347.67	101.00
Treatment capacity	278.00	107.00	255.83	146.50	417.20	100.50
Sewage system (10^6 gal)	215.00	21.00	297.50	57.00	404.00	39.00
Solid waste	–	–	–	–	–	–
Other Services						
Parks (land area)	129.00	13.00	98.00	10.00	67.00	7.00
Libraries						
Books	295.01	173.00	276.17	155.30	410.00	267.00
Floor space	291.03	173.00	271.57	155.40	395.36	267.00

[a]Computed as the ratio between 1985 and 2005.

[b]Undefined.

each county and scenario. The magnitude and duration of impact by infrastructure category and scenario are depicted in Tables 4.20-4.25.

Rate of Change in Infrastructure Demands

The following section describes the growth projected for each infrastructure category and development scenario. Housing is dealt with in more detail because community and CCD impacts are included in the analysis. Tables C.1-C.3 in Appendix C present the change in housing demand by community and CCD for each scenario.

Proposed Action Development Scenario. Housing demand generated in Carbon County through the proposed action scenario developments would increase by more than 200 times during the 1985-2005 period. Every CCD within Carbon County would experience some growth in housing demand, while the Price CCD would absorb the greatest amount of the growth (3,899 additional units in 2005). The city of Price is expected to have the largest increase in housing demand in the Price CCD, rising to a level 2,534 above the baseline in 2005. A large increase is also forecast to occur in the city of East Carbon, where 1,364 additional units would be needed by 2005.

In Emery County, the housing demand resulting from the tar sands projects of the proposed action scenario would be concentrated in the Castle Dale-Huntington CCD. Countywide, there would be an increase in additional housing demand by a factor of 144 over the period. In the Castle Dale-Huntington CCD, a need of 457 additional housing units in 2005 is projected. This growth would be most noticeable in Castle Dale (160 additional units) and Huntington and Orangeville (114 additional units each). The Green River CCD would have an increased demand of only 119 units in 2005.

Very large increases in demand for educational services within both Carbon and Emery counties are projected. In Carbon County, there are projected to be 464 times the number of additional students in 2005 compared to 1985. The growth factor between 1985-2005 is 314 in Emery County. Classrooms and teachers would increase at a rate to maintain standards.

Health care services would not experience increases as large as most other socioeconomic categories. In Carbon County, the cumulative growth factors for these service range from 1.0 to 43.0 times the 1985 level. The greatest increases would occur in the number of hospital beds. Growth factors for health care services in Emery County would be between 1.0 and 4.0, as relatively small impacts are expected during the period.

Public safety would realize relatively moderate increases in demand as a result of the proposed action tar sands projects. The largest growth would be incurred in the amount of jail space; there would be a need for 10,768 additional square feet in 2005 in Carbon County and 1,038 additional square

Table 4.20 Summary of the Changes in Carbon County Infrastructure Service Demands Resulting from the Proposed Action Development Scenario[a]

Service Category in Carbon County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Proposed Action Scenario		Projected Baseline Demand Increment[b]	Proposed Action Scenario		Projected Baseline Demand Increment[b]	Proposed Action Scenario		Projected Baseline Demand Increment[b]	Proposed Action Scenario		Projected Baseline Demand Increment[b]	Proposed Action Scenario	
		Demand[c]	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	1,290	16	1.2	2,126	2,417	53.2	2,396	2,853	54.4	2,528	3,169	55.6	2,636	3,641	58.0
Multifamily	323	4	1.2	532	604	53.2	599	713	54.3	632	792	55.6	659	910	58.0
Mobile homes	538	7	1.3	886	1,007	53.2	998	1,189	54.4	1,053	1,320	55.6	1,098	1,517	58.0
Education															
Students	1,924	14	0.7	3,824	2,297	37.5	4,824	3,494	42.0	4,624	5,130	52.6	4,724	6,501	57.9
Classrooms	77	1	1.3	153	92	37.6	193	140	42.0	185	205	52.6	189	260	57.9
Teachers	77	1	1.3	153	92	37.6	193	140	42.0	185	205	52.6	189	260	57.9
Health Care															
Hospital beds															
General care	15	1	6.3	25	22	46.8	29	30	50.9	30	36	54.6	31	43	58.1
Long-term care	23	0	0	39	10	20.4	39	19	32.8	39	25	39.1	43	29	40.3
Medical personnel															
Doctors	5	1	16.7	8	7	46.7	9	9	50.0	9	11	55.0	10	13	56.5
Dentists	4	1	20.0	7	6	46.2	8	7	46.7	8	9	52.9	8	11	57.9
Nurses	13	1	7.1	21	19	47.5	25	25	50.0	25	31	55.4	26	37	58.7
Public health nurses	2	1	33.3	3	2	40.0	3	3	50.0	3	4	57.1	4	4	50.0
Mental health care															
Clinical psychologists	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health workers	1	1	50.0	2	1	33.3	2	2	50.0	2	2	50.0	2	2	50.0
Public Safety															
Law enforcement															
Police officers	15	1	6.3	25	22	46.8	29	30	50.9	30	36	54.6	31	43	58.1
Patrol cars	15	1	6.3	25	22	46.8	29	30	50.9	30	36	54.6	31	43	58.1
Jail space (sq ft)	3,703	37	1.0	6,161	5,599	47.6	7,161	7,442	51.0	7,306	9,083	55.4	7,551	10,768	58.8
Juvenile holding cells	1	1	50.0	2	2	50.0	2	2	50.0	2	2	50.0	2	3	60.0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	3,000/ 10	1,000/ 4	25.0	3,000/ 10	3,000/ 10	50.0	3,000/ 10	3,500/ 10	53.8	3,000/ 10	4,000/ 10	57.1	3,000/ 10	4,500/ 10	60.0
Emergency Medical Service															
Ambulances	2	1	33.3	3	2	40.0	3	3	50.0	3	4	57.1	4	4	50.0
Emergency medical technicians	14	7	33.3	21	14	40.0	21	21	50.0	21	28	57.1	28	28	50.0
Utility Service Demands															
Water system															
Connections	2,390	24	1.0	3,975	3,612	47.6	4,620	4,801	51.0	4,714	5,860	55.4	4,872	6,948	58.8
Supply (10^6 gal/d)	3.83	0.04	1.0	6.36	5.78	47.6	7.39	7.68	51.0	7.54	9.38	55.4	7.80	11.12	58.8
Storage (10^6 gal/d)	1.78	0.02	1.1	3.18	2.89	47.6	3.70	3.84	50.9	3.77	4.69	55.4	3.90	5.56	58.8
Treatment (10^6 gal/d)	3.83	0.04	1.0	6.36	5.78	47.6	7.39	7.68	51.0	7.54	9.38	55.4	7.80	11.12	58.8
Sewage system (10^6 gal/d)	0.74	0.01	0.9	1.23	1.12	47.7	1.43	1.49	51.0	1.46	1.82	55.5	1.51	2.15	58.7
Solid waste[d]															
Other Services															
Parks (acres)	45	1	2.2	74	67	47.5	86	89	50.9	88	109	55.3	91	129	58.6
Libraries															
Books	14,812	146	1.0	24,642	22,394	47.6	28,642	29,766	51.0	29,222	36,332	55.4	30,202	43,072	58.8
Space (sq ft)	3,703	37	1.0	6,161	5,599	47.6	7,161	7,442	51.0	7,306	9,083	55.4	7,551	10,768	58.8

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (April 1984). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]Less than one person or unit of service required as a result of the change in projected population.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

Table 4.21 Summary of the Changes in Emery County Infrastructure Service Demands Resulting from the Proposed Action Development Scenario[a]

Service Category in Emery County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Proposed Action Scenario		Projected Baseline Demand Increment[b]	Proposed Action Scenario		Projected Baseline Demand Increment[b]	Proposed Action Scenario		Projected Baseline Demand Increment[b]	Proposed Action Scenario		Projected Baseline Demand Increment[b]	Proposed Action Scenario	
		Demand[c]	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	382	2	0.5	448	333	42.6	472	325	40.8	448	317	41.4	412	351	46.0
Multifamily	96	1	1.0	112	83	42.6	118	81	40.7	112	79	41.4	103	88	46.1
Mobile homes	159	1	0.6	187	139	42.6	197	135	40.7	187	132	41.4	172	146	45.9
Education															
Students	816	2	0.2	1,416	317	18.3	1,716	397	18.8	1,516	513	25.3	1,516	627	29.3
Classrooms	33	1	2.9	57	13	18.6	69	16	18.8	61	21	25.6	61	25	29.1
Teachers	33	1	2.9	57	13	18.6	69	16	18.8	61	21	25.6	61	25	29.1
Health Care															
Hospital beds															
General care	6	1	14.3	7	3	30.0	8	3	27.3	7	4	36.4	7	4	36.4
Long-term care	6	0	0	6	1	14.3	6	2	25.0	4	3	42.9	4	3	42.9
Medical personnel															
Doctors	2	1	33.3	3	1	25.0	3	1	25.0	2	1	33.3	2	1	33.3
Dentists	2	1	33.3	2	1	33.3	2	1	33.3	2	1	33.3	2	1	33.3
Nurses	5	1	16.7	6	3	33.3	7	3	30.0	6	3	33.3	6	4	40.0
Public health nurses	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health care															
Clinical psychologists	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health workers	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Public Safety															
Law enforcement															
Police officers	6	1	14.3	7	3	30.0	8	3	27.3	7	4	36.4	7	4	36.4
Patrol cars	6	1	14.3	7	3	30.0	8	3	27.3	7	4	36.4	7	4	36.4
Jail space (sq ft)	1,305	6	0.5	1,695	772	31.3	1,815	846	31.8	1,640	909	35.7	1,550	1,038	40.1
Juvenile holding cells	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	1,750/ 7	1,000/ 4	36.4	2,000/ 8	1,250/ 5	38.5	2,000/ 8	1,250/ 5	33.3	2,000/ 8	1,250/ 5	38.5	2,000/ 8	1,500/ 6	42.9
Emergency Medical Service															
Ambulances	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Emergency medical technicians	7	7	50.0	7	7	50.0	7	7	50.0	7	7	50.0	7	7	50.0
Utility Service Demands															
Water system															
Connections	842	4	0.5	1,094	498	31.3	1,171	546	31.8	1,058	587	35.7	1,000	670	40.1
Supply (10^6 gal/d)	1.35	0.01	0.7	1.75	0.80	31.4	1.87	0.87	31.8	1.69	0.94	35.7	1.60	1.07	40.1
Storage (10^6 gal/d)	0.67	0.01	1.5	0.87	0.40	31.5	0.94	0.44	31.9	0.85	0.47	35.6	0.80	0.54	40.3
Treatment (10^6 gal/d)	1.35	0.01	0.7	1.75	0.80	31.4	1.87	0.87	31.8	1.69	0.94	35.7	1.60	1.07	40.1
Sewage system (10^6 gal/d)	0.26	0.01	3.7	0.34	0.15	30.6	0.36	0.17	32.1	0.33	0.18	35.3	0.31	0.21	40.4
Solid waste[d]															
Other Services															
Parks (acres)	16	1	5.9	21	9	30.0	22	10	31.3	20	11	35.5	19	13	40.6
Libraries															
Books	5,218	24	0.5	6,778	3,086	31.3	7,258	3,384	31.8	6,558	3,636	35.7	6,198	4,152	40.1
Space (sq ft)	1,305	6	0.5	1,695	772	31.3	1,815	846	31.8	1,640	909	35.7	1,550	1,038	40.1

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (April 1984). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]Less than one person or unit of service required as a result of the change in projected population.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

feet in the same year in Emery County. Public safety needs in Emery County would increase much more slowly, with the growth factor for police officers and patrol cars projected to be less than one-tenth the size of that projected for Carbon County (4.0 compared to 43.0).

Utility service demands, including all water system components and the sewage system, would realize the greatest rate of increase in both counties. Growth factors in each category of utility service for the period in Carbon County would be more than 270; in Emery County they would be more than 50.

In each county, the increases incurred in the library services would be equal to the growth in utility demands. Parks would grow less, reaching levels 129 (in Carbon) and 13 (in Emery) times the 1985 levels.

Partial Conversion Development Scenario. The tar sands projects planned under the partial conversion development scenario would create a housing demand in Carbon County 220 times greater than the additional 1985 demand. Price CCD would again be the fastest growing area, with 2,964 additional housing units projected for 2005. The East Carbon CCD would have a need for 1,390 additional housing units in 2005, with 1,029 of these located in the city of East Carbon.

The Castle Dale-Huntington CCD would be the fastest growing CCD in Emery County, with a housing growth factor of more than 200. Castle Dale, Huntington, and Orangeville would have the greatest housing demand increase in the county. The Green River CCD would again grow about one-fifth as much as the Castle Dale-Huntington CCD.

The increases projected in the education system would be as large as any others in the two-county area. The growth in Carbon County would be much faster than in Emery: the number of additional students would increase by a factor of 447 in Carbon and 141 in Emery; the number of teachers and classrooms would each grow by 197 times in Carbon as opposed to 12 times in Emery.

Demands in health care services would grow at a slower pace under this scenario. Carbon County would still realize substantially larger increases than Emery County, with growth factors as high as 28. Growth factors for health care services in Emery County would be between 1.0 and 3.0.

The public safety demands are also projected to grow much faster in Carbon County than in Emery. Police officers and patrol cars would increase by a factor of 33 in Carbon County and 4 in Emery County. Both counties are expected to need more than 100 times more jail space than is projected for 1985.

Large increases are again seen in the utility services. In Carbon County, utility service demands would increase by at least 250 times the additional demand projected for 1985. In Emery County, this utility service

Table 4.22 Summary of the Changes in Carbon County Infrastructure Service Demands Resulting from the Partial Conversion Development Scenario[a]

Service Category in Carbon County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Partial Conversion Scenario		Projected Baseline Demand Increment[b]	Partial Conversion Scenario		Projected Baseline Demand Increment[b]	Partial Conversion Scenario		Projected Baseline Demand Increment[b]	Partial Conversion Scenario		Projected Baseline Demand Increment[b]	Partial Conversion Scenario	
		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	1,290	14	1.1	2,126	752	26.1	2,396	1,644	40.7	2,528	2,314	47.8	2,636	2,762	51.2
Multifamily	323	4	1.2	532	188	26.1	599	411	40.7	632	579	47.8	659	691	51.2
Mobile homes	538	6	1.1	886	313	26.1	998	685	40.7	1,053	964	47.8	1,098	1,151	51.2
Education															
Students	1,924	11	0.6	3,824	712	15.7	4,824	2,017	29.5	4,624	3,767	44.9	4,724	4,916	51.0
Classrooms	77	1	1.3	153	29	15.9	193	81	29.6	185	151	44.9	189	197	51.0
Teachers	77	1	1.3	153	29	15.9	193	81	29.6	185	151	44.9	189	197	51.0
Health Care															
Hospital beds															
General care	15	1	6.3	25	7	21.9	29	18	38.3	30	27	47.4	31	33	51.6
Long-term care	23	1	4.2	39	3	7.1	39	11	22.0	39	19	32.8	43	22	33.8
Medical personnel															
Doctors	5	1	16.7	8	3	27.3	9	6	40.0	9	8	47.1	10	10	50.0
Dentists	4	1	20.0	7	2	22.2	8	5	38.5	8	7	46.7	8	9	52.9
Nurses	13	1	7.1	21	6	22.2	25	15	37.5	25	23	47.9	26	28	51.9
Public health nurses	2	1	33.3	3	1	25.0	3	2	40.0	3	3	50.0	4	4	50.0
Mental health care															
Clinical psychologists	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health workers	1	1	50.0	2	1	33.3	2	1	33.3	2	2	50.0	2	2	50.0
Public Safety															
Law enforcement															
Police officers	15	1	6.3	25	7	21.9	29	18	38.3	30	27	47.4	31	33	51.6
Patrol cars	15	1	6.3	25	7	21.9	29	18	38.3	30	27	47.4	31	33	51.6
Jail space (sq ft)	3,703	30	0.8	6,161	1,735	22.0	7,161	4,261	37.3	7,306	6,652	47.7	7,551	8,147	51.9
Juvenile holding cells	1	1	50.0	2	1	33.3	2	2	50.0	2	2	50.0	2	3	60.0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	3,000/ 10	1,000/ 4	25.0	3,000/ 10	1,750/ 7	36.8	3,000/ 10	3,000/ 10	50.0	3,000/ 10	3,500/ 10	53.8	3,000/ 10	4,000/ 10	57.1
Emergency Medical Service															
Ambulances	2	1	33.3	3	1	25.0	3	2	40.0	3	3	50.0	4	4	50.0
Emergency medical technicians	14	7	33.3	21	7	25.0	21	14	40.0	21	21	50.0	28	28	50.0
Utility Service Demands															
Water system															
Connections	2,390	20	0.8	3,975	1,120	22.0	4,620	2,749	37.3	4,714	4,292	47.7	4,872	5,257	51.9
Supply (10^6 gal/d)	3.83	0.03	0.8	6.36	1.79	22.0	7.39	4.40	37.3	7.54	6.87	47.7	7.80	8.41	51.9
Storage (10^6 gal/d)	1.78	0.02	1.1	3.18	0.90	22.1	3.70	2.20	37.3	3.77	3.43	47.6	3.90	4.21	51.9
Treatment (10^6 gal/d)	3.83	0.03	0.8	6.36	1.79	22.0	7.39	4.40	37.3	7.54	6.87	47.7	7.80	8.41	51.9
Sewage system (10^6 gal/d)	0.74	0.01	1.3	1.23	0.35	22.2	1.43	0.85	37.3	1.46	1.33	47.7	1.51	1.63	51.9
Solid waste[c]															
Other Services															
Parks (acres)	45	1	2.2	74	21	22.1	86	52	37.7	88	80	47.6	91	98	51.9
Libraries															
Books	14,812	118	0.8	24,642	6,938	22.0	28,642	17,042	37.3	29,222	26,606	47.7	30,202	32,588	51.9
Space (sq ft)	3,703	30	0.8	6,161	1,735	22.0	7,161	4,261	37.3	7,306	6,652	47.7	7,551	8,147	51.9

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (June 1983). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

Table 4.23 Summary of the Changes in Emery County Infrastructure Service Demands Resulting from the Partial Conversion Development Scenario[a]

Service Category in Emery County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Partial Conversion Scenario		Projected Baseline Demand Increment[b]	Partial Conversion Scenario		Projected Baseline Demand Increment[b]	Partial Conversion Scenario		Projected Baseline Demand Increment[b]	Partial Conversion Scenario		Projected Baseline Demand Increment[b]	Partial Conversion Scenario	
		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	382	2	0.5	448	104	18.8	472	171	26.6	448	237	34.6	412	270	39.6
Multifamily	96	1	1.0	112	26	18.8	118	43	26.7	112	60	34.9	103	68	39.8
Mobile homes	159	1	0.6	187	43	18.7	197	72	26.8	187	99	34.6	172	113	39.6
Education															
Students	816	2	0.2	1,416	80	5.3	1,716	64	3.6	1,516	227	13.0	1,516	281	15.6
Classrooms	33	1	2.9	57	4	6.6	69	3	4.2	61	10	14.1	61	12	16.4
Teachers	33	1	2.9	57	4	6.6	69	3	4.2	61	10	14.1	61	12	16.4
Health Care															
Hospital beds															
General care	6	1	14.3	7	1	12.5	8	2	20.0	7	3	30.0	7	4	36.4
Long-term care	6	1	14.3	6	1	14.3	6	1	14.3	4	2	33.3	4	2	33.3
Medical personnel															
Doctors	2	1	11.1	3	1	11.1	3	1	25.0	2	1	33.3	2	1	33.3
Dentists	2	1	33.3	2	1	33.3	2	1	33.3	2	1	33.3	2	1	33.3
Nurses	5	1	16.7	6	1	14.3	7	2	22.2	6	3	33.3	6	3	33.3
Public health nurses	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health care															
Clinical psychologists	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health workers	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Public Safety															
Law enforcement															
Police officers	6	1	14.3	7	1	12.5	8	2	20.0	7	3	30.0	7	4	36.4
Patrol cars	6	1	14.3	7	1	12.5	8	2	20.0	7	3	30.0	7	4	36.4
Jail space (sq ft)	1,305	5	0.4	1,695	238	12.3	1,815	438	19.4	1,640	662	28.8	1,550	777	33.4
Juvenile holding cells	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	1,750/ 7	1,000/ 4	36.4	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,250/ 5	38.5	2,000/ 8	1,250/ 5	38.5
Emergency Medical Service															
Ambulances	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Emergency medical technicians	7	7	50.0	7	7	50.0	7	7	50.0	7	7	50.0	7	7	50.0
Utility Service Demands															
Water system															
Connections	842	4	0.5	1,094	154	12.3	1,171	283	19.5	1,058	427	28.8	1,000	501	33.4
Supply (10^6 gal/d)	1.35	0.01	0.7	1.75	0.25	12.5	1.87	0.45	19.4	1.69	0.68	28.7	1.60	0.80	33.3
Storage (10^6 gal/d)	0.67	0.01	1.5	0.87	0.12	12.1	0.94	0.23	19.7	0.85	0.34	28.6	0.80	0.40	33.3
Treatment (10^6 gal/d)	1.35	0.01	0.7	1.75	0.25	12.5	1.87	0.45	19.4	1.69	0.68	28.7	1.60	0.80	33.3
Sewage system (10^6 gal/d)	0.26	0.01	3.7	0.34	0.05	12.8	0.36	0.09	20.0	0.33	0.13	28.3	0.31	0.16	34.0
Solid waste[c]															
Other Services															
Parks (acres)	16	1	5.9	21	3	12.5	22	6	21.4	20	8	28.6	19	10	34.5
Libraries															
Books	5,218	20	0.4	6,778	952	12.3	7,258	1,750	19.4	6,558	2,646	28.7	6,198	3,106	33.4
Space (sq ft)	1,305	5	0.4	1,695	238	12.3	1,815	438	19.4	1,640	662	28.8	1,550	777	33.4

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (June 1983). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

growth is projected to be around 140 times the forecasted 1985 levels. These expected demand increases would make the water and solid-waste utilities the fastest growing socioeconomic category in the area, and, thereby, the most severely impacted.

Libraries services would again grow at the same rate as utilities services: a growth factor of 276 in Carbon County and 155 in Emery County. Parks would expand much less, with increases projected to be 98 times the 1985 level in Carbon and 10 times the 1985 level in Emery.

Unitized Development Scenario. In 2005, housing demand in Carbon County due to the unitized development scenario would reach a level 304 times the 1985 level. The largest proportion of the housing demand growth would occur in the Price CCD, but the East Carbon CCD would also experience a large increase in demand. By far the fastest growing city would be Price, where the additional housing demand for 2005 would be 320 greater than the additional demand projected for 1985.

Comparatively, Emery County would grow only slightly, with no housing impact expected until 1995. After this, demand would increase by 297 housing units, with 227 of these in the Castle Dale-Huntington CCD. Since there would be no impact in 1985, cumulative growth factors cannot be computed for the Emery CCDs or communities.

Demands on the education system are projected to increase dramatically in Carbon County: additional students are projected to increase by a factor of 644, and additional teachers and classrooms by a factor of 129 each. No additional demands are forecast to be incurred in Emery County, so cumulative growth factors cannot be computed.

Health care services are projected to increase less than under the other two scenarios. Impacts in Emery County would be relatively small, with the greatest growth expected to be 200%. In Carbon County, however, health service demands are projected to increase by a factor between 1.0 and 23.0. The number of general care hospital beds and nurses would again realize the greatest proportion of the impact.

Public safety services would increase at a rate slightly higher than health care. Carbon County is projected to have the greatest increase in police officers and patrol cars: demand would grow by a factor of 23, compared to a factor of 3 in Emery County. Large increases would also occur in the amount of jail space, reaching growth levels in 2005 several hundred times the 1985 demand in both counties.

Demand for utility services would increase greatly, with growth factors in Carbon County exceeding 350 and growth factors in Emery County exceeding 100. These projected changes in demand for services would again make this the fastest growing infrastructure sector.

Table 4.24 Summary of the Changes in Carbon County Infrastructure Service Demands Resulting from the Unitized Development Scenario[a]

Service Category in Carbon County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Unitized Development Scenario		Projected Baseline Demand Increment[b]	Unitized Development Scenario		Projected Baseline Demand Increment[b]	Unitized Development Scenario		Projected Baseline Demand Increment[b]	Unitized Development Scenario		Projected Baseline Demand Increment[b]	Unitized Development Scenario	
		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	1,290	6	0.5	2,126	10	0.5	2,396	716	23.0	2,528	1,358	34.9	2,636	1,825	40.9
Multifamily	323	2	0.6	532	3	0.6	599	179	23.0	632	340	35.0	659	457	40.9
Mobile homes	538	3	0.6	886	4	0.4	998	298	23.0	1,053	566	35.0	1,098	761	40.9
Education															
Students	1,924	5	0.3	3,824	9	0.2	4,824	957	16.6	4,624	2,242	32.7	4,724	3,219	40.5
Classrooms	77	1	1.3	153	1	0.6	193	39	16.8	185	90	32.7	189	129	40.6
Teachers	77	1	1.3	153	1	0.6	193	39	16.8	185	90	32.7	189	129	40.6
Health Care															
Hospital beds															
General care	15	1	6.3	25	1	3.8	29	8	21.6	30	16	34.8	31	23	42.6
Long-term care	23	1	4.2	39	1	2.5	39	3	7.1	39	10	20.4	43	13	23.2
Medical personnel															
Doctors	5	1	16.7	8	1	11.1	9	3	25.0	9	5	35.7	10	7	41.2
Dentists	4	1	20.0	7	1	12.5	8	2	20.0	8	4	33.3	8	6	42.9
Nurses	13	1	7.1	21	1	4.5	25	7	21.8	25	14	35.9	26	19	42.2
Public health nurses	2	1	33.3	3	1	25.0	3	1	25.0	3	2	20.0	4	3	42.9
Mental health care															
Clinical psychologists	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health workers	1	1	50.0	2	1	33.3	2	1	33.3	2	1	33.3	2	2	50.0
Public Safety															
Law enforcement															
Police officers	15	1	6.3	25	1	3.8	29	8	21.6	30	16	34.8	31	23	42.6
Patrol cars	15	1	6.3	25	1	3.8	29	8	21.6	30	16	34.8	31	23	42.6
Jail space (sq ft)	3,703	14	0.4	6,161	22	0.4	7,161	1,854	20.6	7,306	3,981	35.3	7,551	5,535	42.3
Juvenile holding cells	1	1	50.0	2	1	33.3	2	1	33.3	2	2	50.0	2	2	50.0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	3,000/ 10	1,000/ 4	25.0	3,000/ 10	1,000/ 4	25.0	3,000/ 10	2,000/ 8	40.0	3,000/ 10	2,500/ 10	45.5	3,000/ 10	3,000/ 10	50.0
Emergency Medical Service															
Ambulances	2	1	33.3	3	1	25.0	3	1	25.0	3	2	40.0	4	3	42.9
Emergency medical technicians	14	7	33.3	21	7	25.0	21	7	25.0	21	14	40.0	28	21	42.9
Utility Service Demands															
Water system															
Connections	2,390	9	0.4	3,975	14	0.4	4,620	1,197	20.6	4,714	2,569	35.3	4,872	3,572	42.3
Supply (10^6 gal/d)	3.83	0.01	0.3	6.36	0.02	0.3	7.39	1.92	20.6	7.54	4.11	35.3	7.80	5.72	42.3
Storage (10^6 gal/d)	1.78	0.01	0.6	3.18	0.01	0.3	3.70	0.96	20.6	3.77	2.06	35.3	3.90	2.86	42.3
Treatment (10^6 gal/d)	3.83	0.01	0.3	6.36	0.02	0.3	7.39	1.92	20.6	7.54	4.11	35.3	7.80	5.72	42.3
Sewage system (10^6 gal/d)	0.74	0.01	1.3	1.23	0.01	0.8	1.43	0.37	20.6	1.46	0.80	35.4	1.51	1.11	42.4
Solid waste[c]															
Other Services															
Parks (acres)	45	1	2.2	74	1	1.3	86	23	21.1	88	48	35.3	91	67	42.4
Libraries															
Books	14,812	54	0.4	24,642	86	0.3	28,642	7,416	20.6	29,222	15,924	35.3	30,202	22,140	42.3
Space (sq ft)	3,703	14	0.4	6,161	22	0.4	7,161	1,854	20.6	7,306	3,981	35.3	7,551	5,535	42.3

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (June 1983). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

Table 4.25 Summary of the Changes in Emery County Infrastructure Service Demands Resulting from the Unitized Development Scenario[a]

Service Category in Emery County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Unitized Development Scenario		Projected Baseline Demand Increment[b]	Unitized Development Scenario		Projected Baseline Demand Increment[b]	Unitized Development Scenario		Projected Baseline Demand Increment[b]	Unitized Development Scenario		Projected Baseline Demand Increment[b]	Unitized Development Scenario	
		Demand[c]	% of Total		Demand[c]	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	382	1	0.3	448	1	0.2	472	86	15.4	448	139	23.7	412	179	30.3
Multifamily	96	1	1.0	112	1	0.9	118	22	15.7	112	35	23.8	103	45	30.4
Mobile homes	159	1	0.6	187	1	0.5	197	36	15.5	187	58	23.7	172	75	30.4
Education															
Students	816	0	0	1,416	0	0	1,716	43	2.4	1,516	167	9.9	1,516	213	12.3
Classrooms	33	0	0	57	0	0	69	2	2.8	61	7	10.3	61	9	12.9
Teachers	33	0	0	57	0	0	69	2	2.8	61	7	10.3	61	9	12.9
Health Care															
Hospital beds															
General care	6	1	14.3	7	1	12.5	8	1	11.1	7	2	22.2	7	3	30.0
Long-term care	6	1	14.3	6	1	14.3	6	1	14.3	4	1	20.0	4	1	20.0
Medical personnel															
Doctors	2	1	33.3	3	1	25.0	3	1	25.0	2	1	33.3	2	1	33.3
Dentists	2	1	33.3	2	1	33.3	2	1	33.3	2	1	33.3	2	1	33.3
Nurses	5	1	16.7	6	1	14.3	7	1	12.5	6	2	25.0	6	2	25.0
Public health nurses	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health care															
Clinical psychologists	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health workers	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Public Safety															
Law enforcement															
Police officers	6	1	14.3	7	1	12.5	8	1	11.1	7	2	22.2	7	3	30.0
Patrol cars	6	1	14.3	7	1	12.5	8	1	11.1	7	2	22.2	7	3	30.0
Jail space (sq ft)	1,305	2	0.2	1,695	2	0.1	1,815	220	10.8	1,640	415	20.2	1,550	534	25.6
Juvenile holding cells	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	1,750/ 7	1,000/ 4	36.4	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3
Emergency Medical Service															
Ambulances	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Emergency medical technicians	7	7	50.0	7	7	50.0	7	7	50.0	7	7	50.0	7	7	50.0
Utility Service Demands															
Water system															
Connections	842	2	0.2	1,094	1	0.1	1,171	142	10.8	1,058	268	20.2	1,000	345	25.7
Supply (10^6 gal/d)	1.35	0.01	0.7	1.75	0.01	0.6	1.87	0.23	11.0	1.69	0.43	20.3	1.60	0.55	25.6
Storage (10^6 gal/d)	0.67	0.01	1.5	0.87	0.01	1.1	0.94	0.11	10.5	0.85	0.21	19.8	0.80	0.28	25.9
Treatment (10^6 gal/d)	1.35	0.01	0.7	1.75	0.01	0.6	1.87	0.23	11.0	1.69	0.43	20.3	1.60	0.55	25.6
Sewage system (10^6 gal/d)	0.26	0.01	3.7	0.34	0.01	2.9	0.36	0.04	10.0	0.33	0.08	19.5	0.31	0.11	26.2
Solid waste[d]															
Other Services															
Parks (acres)	16	1	5.9	21	1	4.5	22	3	12.0	20	5	20.0	19	7	26.9
Libraries															
Books	5,218	8	0.2	6,778	6	0.1	7,258	880	10.8	6,558	1,658	20.2	6,198	2,136	25.6
Space (sq ft)	1,305	2	0.2	1,695	2	0.1	1,815	220	10.8	1,640	415	20.2	1,550	534	25.6

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (June 1983). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]Less than one person or unit of service required as a result of the change in projected population.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

Libraries in Carbon County would grow at the same rate as utilities during the 1985-2005 period. In Emery, these increases would be more than double those in utilities, with a growth factor of 267 projected. Parks would grow less under this scenario than under any other. Growth factors would be 67 for Carbon County and seven for Emery County.

Magnitude of Impact by Scenario on Infrastructure Demands

The following section describes the magnitude of infrastructure impacts by county under each Sunnyside STSA scenario. The infrastructure impacts caused by these scenarios are presented as a percentage of the county totals which are projected to exist in each window year. Data are shown in Tables 4.20-4.25. The third column of every window year presents the proportion of the total new service demand that is required for the growth created by the tar sands development scenario being considered.

Proposed Action Development Scenario. In Carbon County the change in infrastructure service demands caused by the projects included in the proposed action scenario would constitute around 50% of the total new demand (baseline and proposed action scenario projects) for each service category. Negligible impacts are projected in 1985, but by 2005 the infrastructure impacts would make up nearly 60% of the total in each service category. In 1990 and 1995, the additional infrastructure demands caused by the proposed action scenario would constitute 50% or less of the county totals in every category except housing. During the study period new infrastructure demands are not projected to exceed 60% of the total service requirements.

The impact of the proposed action scenario tar sands projects would have much less effect in Emery County. In 1985, the infrastructure impacts of the scenario would compose less than 1% of the total demand in many service categories, but would grow to account for between 14% and 50% of the total in 1990. Slight increases in infrastructure demand are expected in 1995 under the scenario, but it is forecast that these impacts will constitute between 33% and 50% of the total in most categories in 2005. The most notable exception would be education, whose new infrastructure demands created by the scenario projects would constitute less than 30% of the total county demands in 2005. The new infrastructure demands created by the tar sands projects would not exceed 50% of the total service requirements in 2005.

Partial Conversion Development Scenario. The impacts on the public and private infrastructure from the tar sands projects would grow steadily from 1985 to 2005 in Carbon County under this development scenario. In 1985, the infrastructure demands from the partial conversion scenario would account for less than 10% of the total service demands in the county. In 1990, this impact proportion would rise to between 20% and 30% of the total in almost every category. By 2005, the infrastructure demands created by the tar sands

projects of the partial conversion scenario would constitute at least 50% of the total demands in every service category. The proportion of infrastructure impacts attributable to the partial conversion scenario is between 50% and 52% in almost every category.

Under this scenario, the infrastructure impacts of the tar sands projects in Emery County are also expected to increase steadily throughout the period 1985-2005. Very small impacts are expected in 1985, but, by 2005, the infrastructure impacts are forecast to grow to between 30% and 50% of the total new infrastructure demands in that window year. The only category which would not reach this impact proportion is education, where the partial conversion scenario impacts on Emery's infrastructure are projected to constitute around 16% of the total. The scenario-induced infrastructure impacts in every category are 50% or less throughout the 1985-2005 period.

Unitized Development Scenario. The infrastructure impacts of the tar sands activities in Carbon County under this development scenario would be less than under either of the other two scenarios. In 1985, scenario-induced infrastructure impacts, as a proportion of the total, would be less than 10% in most categories and less than 1% in many. Steady increases in the proportion of infrastructure impact attributable to the scenario are projected throughout the period, such that, in 2005, the impact of the unitized development scenario would constitute between 40% and 50% of the total infrastructure demands in all service categories. At no time during the period would demand generated by the tar sands activities of the unitized development scenario exceed 50% of the county total.

Emery County would experience even fewer infrastructure impacts than Carbon as a result of the unitized development scenario. Although the Emery infrastructure impacts from the scenario increase regularly throughout the period, they are never expected to constitute more than 35% of the county totals in most categories. The level of scenario-induced infrastructure impact in 2005 would constitute between 25% and 33% of the total demands for most categories; education is the notable exception, with a projected impact of less than 13% under the unitized development scenario. Like the trend in Carbon County, the Emery infrastructure impacts under this scenario would be fewer than those projected under the other two scenarios.

5 SOCIOECONOMIC IMPACTS ASSOCIATED WITH DEVELOPMENT OF THE OTHER ENERGY PROJECTS IN CARBON AND EMERY COUNTIES

There are numerous energy projects planned or projected for development in Carbon and Emery counties. This section analyzes the potential socio-economic impacts of those projects -- i.e., coal mine developments and a Chevron off-tract tar sands facility -- relative to the projected baseline conditions described in Sec. 2. Two scenarios will be analyzed here. The first is a Maximum Development Scenario, which consists of the Chevron off-tract tar sands facility plus some coal production (production above the baseline level). The second is a Limited Development Scenario, which consists of the same coal production as that projected for the Maximum Development Scenario but lacks the Chevron facility. The cumulative effects of the forecasted population and employment impacts from these developments on the tar sands development scenarios are addressed in Sec. 6.

5.1 MANPOWER REQUIREMENTS

This section identifies and briefly describes the anticipated or planned energy projects located in Carbon and Emery counties. Table 5.1 presents the individual projects and their respective manpower requirements that comprise the other energy developments proposed for Carbon and Emery counties. Figure 5.1 identifies the location of the 20 coal mines included in this analysis (shown by the cross-picks). Note that they are concentrated along the western border of Carbon and Emery counties and in central Carbon County, adjacent to the Sunnyside site.

The total coal production for the two-county area is projected to be 42.4×10^6 ton/year. The manpower requirement for the total coal production is projected to be as low as 5,525 construction and operation workers in 1984 and as high as 9,359 workers in 1995. Of total coal production, 20.8×10^6 ton/year are expected to be new coal production, or production above the baseline level. It is this production that is analyzed in this section. (Baseline coal production effects on the area are incorporated in the discussion of the baseline projections -- Sec. 2). No distinction is made in Table 5.1 between projects that are baseline and those that are planned or proposed.

The new coal development is projected to be more than 49% of the total coal production. To meet the manpower requirements of the new coal production, it is expected that 775 (14% of total) workers will be needed in 1984; the requirement will reach its peak requirement in 1995, when 4,009 (43% of total) construction and operation workers will be needed.

As for the individual projects, the largest is the Utah Power and Light (UP&L) development. Its production level is 6.1×10^6 ton/year, and it is expected to have a manpower requirement of 1,800 to 1,850 workers. This

Table 5.1 Manpower Requirements for the Other Energy Developments Proposed in Carbon and Emery Counties

Project	Type of Development	Project Size[a]	Project Phase	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	2000	2005
Kaiser-Sunnyside	Coal Mine	0.9×10^6 t/y	Total	458	460	460	460	460	460	460	460	460	460	460	460	460	460
Sunedco	Coal Mine	5.0×10^6 t/y	Total	115	335	328	495	589	655	750	775	775	775	775	775	775	775
Calif. Portland - Soldier Creek	Coal Mine	0.9×10^6 t/y	Total	170	170	170	170	170	170	170	170	170	170	170	170	170	170
Plateau	Coal Mine	1.0×10^6 t/y	Total	300	500	500	500	500	500	550	550	550	550	550	550	550	550
Tower Resources	Coal Mine	1.0×10^6 t/y	Total	150	200	200	200	200	200	200	200	200	200	200	200	200	200
U.S. Fuels	Coal Mine	3.4×10^6 t/y	Total	425	450	500	725	725	725	725	725	725	725	725	725	725	725
Pleasant Valley Coal Partners	Coal Mine	1.0×10^6 t/y	Total	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Beaver Creek Gordon Creek #2	Coal Mine	1.0×10^6 t/y	Total	170	170	170	170	170	170	170	170	170	170	170	170	170	170
Coastal States	Coal Mine	5.0×10^6 t/y	Total	200	220	500	650	800	900	900	900	900	900	900	900	900	900
First Western	Coal Mine	0.2×10^6 t/y	Total	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Price River	Coal Mine	5.5×10^6 t/y	Total	130	550	550	550	550	550	750	800	850	875	900	1020	1200	1200
Energy Fuels	Coal Mine	0.7×10^6 t/y	Total	109	109	109	109	109	109	109	109	109	109	109	109	109	109
Valley Camp - Belina	Coal Mine	2.0×10^6 t/y	Total	500	500	500	500	500	500	880	880	880	880	880	880	880	880
Beaver Camp (Hunt. 4)	Coal Mine	0.7×10^6 t/y	Total	125	125	125	125	125	125	125	125	125	125	125	125	125	125
Coop	Coal Mine	0.2×10^6 t/y	Total	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Genwall	Coal Mine	0.2×10^6 t/y	Total	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Natomas	Coal Mine	0.6×10^6 t/y	Total	200	200	200	200	200	200	200	200	200	200	200	200	200	200
UP&L	Coal Mine	6.1×10^6 t/y	Total	1800	1800	1800	1800	1800	1800	1850	1850	1850	1850	1850	1850	1850	1850
Kaiser - South Lease	Coal Mine	1.0×10^6 t/y	Total	50	56	112	206	300	450	475	475	475	475	475	475	475	475
Consolidation	Coal Mine	4.0×10^6 t/y	Total	273	290	312	334	356	378	400	400	400	400	400	400	400	400

Table 5.1 (Cont'd)

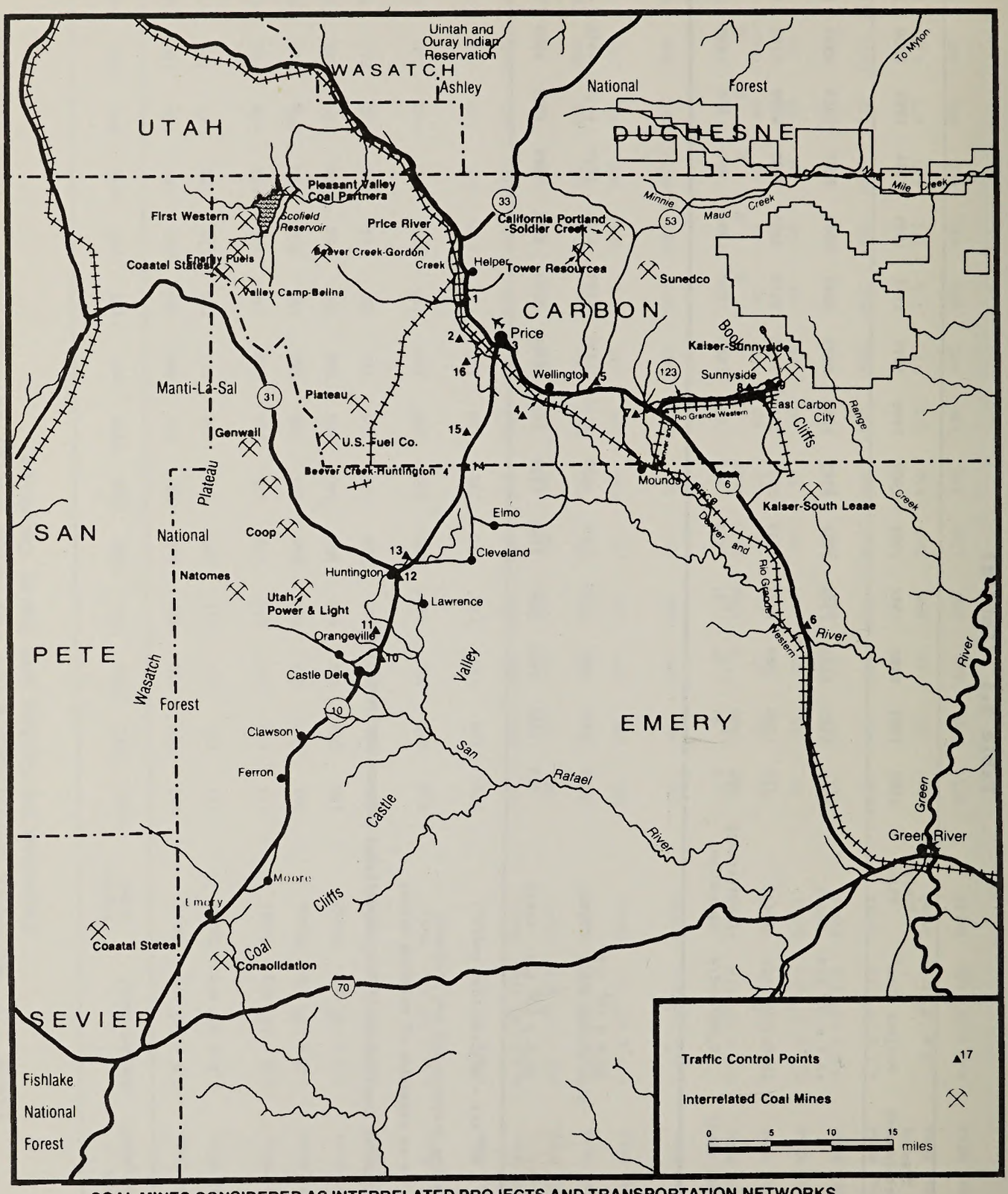
Project	Type of Development	Project Size[a]	Project Phase	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	2000	2005
Total Coal Development[b]		42.4 x 10^6 t/y	Total	5525	6485	6886	7544	7904	8242	9064	9139	9189	9214	9239	9359	9539	9539
Total New Coal Development[c]		20.8 x 10^6 t/y	Total	775	1565	1886	2487	2748	2939	3714	3789	3839	3864	3889	4009	4189	4189
Chevron/Great National Tar Sands	Tar Sands	10,000 bbl/d	Construction	490	490	0	1000	2400	1000	0	0	0	0	0	0	0	0
			Operation	0	81	81	81	242	450	450	450	450	450	450	450	450	450
Total Manpower Requirements:																	
Maximum Development Scenario		20.8 x 10^6 t/y plus 10,000 bbl/d	Total	1265	2136	1967	3568	5390	4389	4164	4239	4289	4314	4339	4459	4639	4639
Limited Development Scenario		20.8 x 10^6 t/y	Total	775	1565	1886	2487	2748	2939	3714	3789	3839	3864	3889	4009	4189	4189

[a] bbl/d = barrels/day; x 10^6 t/y = million tons/year.

[b] All coal mines: baseline projects and new proposed.

[c] New mines or leases, or an expansion of existing mines.

Source: Utah State Planning Coordinators Office, unpublished information (April 1984).



COAL MINES CONSIDERED AS INTERRELATED PROJECTS AND TRANSPORTATION NETWORKS

Fig. 5.1 Location of New Coal Mine Developments in Carbon and Emery Counties

constitutes about a third of the total manpower requirement of the area in 1984 and about 20% of the area's 1995 requirement. The smallest project (in terms of production and manpower) is the Genwall development, with a projected production level of 0.2×10^6 ton/year (less than one-half of one percent of the total production) and a constant manpower requirement of 20 workers throughout the period.

The Chevron/Great National tar sands development is expected to have a manpower requirement in 1984 of 490 construction and zero operation workers. The peak is expected in 1988, when 2,642 workers will be needed (2,400 construction workers and 242 operation workers).

The manpower requirements of the maximum and limited development scenarios are provided at the bottom of Table 5.1. Note that the limited scenario is the same as the maximum scenario, except for the Chevron off-tract facility that is included only in the maximum development scenario.

5.2 SUMMARY OF AREAWIDE IMPACTS BY SOCIOECONOMIC DEVELOPMENT CATEGORY

This section contains a summary of the areawide socioeconomic impacts that would potentially occur as a result of the other energy developments in the two-county area. Two important assumptions underlie these impact projections. The first assumption is that the baseline projections (described in Sec. 2) would accurately reflect the socioeconomic composition of the counties in the time period under study. The second assumption is that the manpower requirements of the other energy projects (described in Sec. 5.1) would not change. Given these two assumptions, the following analysis is based on the difference between the baseline projections and the projected impacts of the other energy projects.

Each of the two scenarios is discussed separately; Sec. 5.2.1 contains the projected impacts under the Maximum Development scenario, and Sec. 5.2.2 discusses the Limited Development scenario.

5.2.1 Maximum Development Scenario

The projected impacts of the maximum development scenario on the area are discussed in this section. These socioeconomic impacts by development category and window year are presented in Table 5.2; all of the projections are presented as a change from the baseline projections for each window year. Table 5.3 indicates the projected impact on areawide income by sector. A discussion of the impacts by category follows.

The population of the area, as a result of the maximum development scenario, is projected to grow from 6,259 above the baseline in 1985 to 21,259 above it in 2005. Additional school-age population is expected to expand at approximately the same rate, as both this category and total population

Table 5.2 Summary of Areawide Socioeconomic Impacts, by Category and Window Year, for the Maximum Development Scenario

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-2005	1985-1995	1995-2005
Population Growth								
Total	6,259	14,208	19,778	22,194	21,259	3.40	12.19	0.72
School-age	1,192	2,823	5,213	6,942	6,436	5.40	15.90	2.13
Retirement-age	117	645	793	860	794	6.79	21.09	0.01
Employment Growth (no. of jobs)	3,309	6,856	8,334	9,140	8,942	2.70	9.68	0.71
Household Growth	2,191	4,601	5,911	6,395	6,185	2.82	10.43	0.45
Infrastructure Requirements								
Housing								
Single-family units	1,315	2,761	3,547	3,837	3,711	2.82	10.43	0.45
Multifamily units	329	690	887	959	928	2.82	10.43	0.45
Mobile homes	548	1,151	1,478	1,599	1,547	2.82	10.43	0.46
Education								
Students	1,192	2,823	5,213	6,942	6,436	5.40	15.90	2.13
Classrooms	48	113	209	278	257	5.35	15.85	2.09
Teachers	48	113	209	278	257	5.35	15.85	2.09
Health Care								
Hospital beds								
General care	12	29	39	44	42	3.50	12.51	0.74
Long-term care	4	26	32	35	32	8.00	23.11	0
Medical personnel								
Doctors	3	8	12	14	13	4.33	14.87	0.80
Dentists	3	7	10	11	11	3.67	12.79	0.96
Nurses	11	24	34	38	36	3.27	11.95	0.57
Public health nurses	1	3	4	4	4	4.00	14.87	0
Mental health care								
Clinical psychologists	0	1	1	1	1	a	a	0
Mental health workers	1	1	2	2	2	2.00	7.18	0
Public Safety								
Law enforcement								
Police officers	12	29	39	44	42	3.50	12.51	0.74
Patrol cars	12	29	39	44	42	3.50	12.51	0.74
Jail space (sq ft)	3,130	7,105	9,890	11,098	10,630	3.40	12.19	0.72
Juvenile holding cells	1	2	2	3	3	3.00	7.18	4.14
Fire Protection								
Fire hydrant flow (gpm)/duration (hr)[c]	-	-	-	-	-	-	-	-
Emergency Medical Service								
Ambulances	1	3	4	4	4	4.00	14.87	0
Emergency medical technicians	7	21	28	28	28	4.00	14.87	0
Utility Service Demands								
Water system								
Connections	2,019	4,584	6,380	7,160	6,858	3.40	12.19	0.73
Supply (10^6 gal/d)	3.23	7.33	10.21	11.45	10.98	3.40	12.20	0.73
Storage (10^6 gal/d)	1.62	3.67	5.10	5.73	5.49	3.39	12.15	0.74
Treatment (10^6 gal/d)	3.23	7.33	10.21	11.45	10.98	3.40	12.20	0.73
Sewage system (10^6 gal/d)	0.63	1.42	1.98	2.22	2.13	3.38	12.13	0.73
Solid waste[d]								

Table 5.2 (Cont'd)

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-2005	1985-1995	1995-2005
Other Services								
Parks (acres)	38	85	119	133	128	3.37	12.09	0.73
Libraries								
Books	12,518	28,416	39,556	44,388	42,518	3.40	12.19	0.72
Space (sq ft)	3,130	7,105	9,890	11,098	10,630	3.40	12.19	0.72

[a]Computed as ratio between 1985 and 2005.

[b]Undefined.

[c]Fire protection measured in fire hydrant flow (gpm)/ duration (hr) cannot be aggregated across the affected counties. See Tables 5.16 and 5.17 for county-specific detail.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid-waste disposal impacts could not be determined.

increase by about 12% to 16% annually during the first 10 years of the development scenario. From 1995 to 2005, all three population divisions (total, school-age, and retirement-age) are forecast to increase over the baseline at a slower rate; total population would increase by more than 7%, school-age population by more than 23%, and retirement-age population would remain almost unchanged. These changes represent average annual increases of less than 2.1%.

Under the maximum development scenario, total areawide employment is expected to increase in much the same manner as population. Employment would realize significant growth from 1985 to 1995 (average annual increases of 10%); its growth would then be less than 1% annually over the remaining 10 years under study. The maximum development scenario is forecast to result in total areawide employment growth of 8,942 by the year 2005.

The number of new households is also expected to grow significantly from 1985 to 1995 and by a slower rate thereafter as a result of the maximum development scenario. The number of new households is projected to rise from 2,191 in 1985 to 5,911 in 1995 -- an increase of almost 170%. Over the following 10 years, however, the number of households is expected to increase annually by 4.6%, to 6,185 additional households in 2005.

The demand for housing of all forms follows the same trends as the growth in number of households. Single-family housing is still expected to be the dominant form of housing through the scenario development period, and would account for 3,711 of the 6,186 additional units projected for the year 2005. In this same year, there are projected to be 1,547 additional mobile homes and 928 additional multifamily units. These figures for 2005 represent increases of about three times the projected 1985 level. The standard for

housing distribution remains constant throughout the period, and is as follows: 60% single-family units, 25% mobile homes, and 15% multifamily units.

Demands imposed on the education system by the maximum development scenario are expected to increase at the same rate as those impact categories already analyzed. The number of additional students would increase to more than five times the 1985 level. Classrooms and teachers would also increase at a substantial rate, with growth in both the number of classrooms and teachers projected to increase by nearly 16% annually from 1985 to 1995 and by 2.09% annually thereafter. The rate of increase for students, teachers, and classrooms over the last 10 years would maintain the community standards of student-teacher proportions.

Health care services would not increase as rapidly as most other categories as a result of the other energy projects included in the maximum development scenario. The number of general care hospital beds projected to be required due to these projects would rise by more than 12% annually from 1985 to 1995, and by 0% to 0.7% annually thereafter for long-term care and general care hospital beds. Similar increases are projected in the number of medical personnel. The number of nurses would increase the most, rising from 11 above the baseline in 1985 to 36 above it in 2005, representing more than a threefold increase. Mental health care would undergo little change over the 20-year period as a result of the scenario developments.

Increases projected in public safety are similar in magnitude to those projected for health care services. The number of officers and that of patrol cars each would rise to a level 42 above the baseline in 2005. This represents a 12.5% yearly increase from 1985 to 1995 and a 0.7% yearly increase thereafter. The amount of jail space is projected to increase by 12.2% annually during the first 10 years and by 0.7% annually thereafter. The numbers of ambulances and emergency medical technicians would both increase by 300% over the period.

All utility services, park services, and library services would be required to increase at approximately the same rate as a result of the maximum development scenario. Increases in all of these services are projected to rise by at least 12% annually from 1985 to 1995 and by 0.7% annually from 1995 to 2005.

Areawide Impact on Total Wages and Personal Income

The total areawide wage and personal income effects of the scenario are presented in Table 5.3. The wage and income data are presented by economic sector and income category. All sectors were assumed to have an approximate annual increase in monthly wages of 1.72% unless otherwise noted. Furthermore, wages in all sectors, unless identified, would increase by 40% over the 20-year period.

Table 5.3 Total Areawide Wage and Personal Income Impact Projections, by Economic Sector, as a Result of the Maximum Development Scenario[a]

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Mining							
Average monthly wage (1980 $)	2,157	2,517	2,559	2,787	3,036	1.72	1.72
Change from baseline							
Number of employees	1,646	4,164	4,460	4,640	4,640	10.48	0.40
Total wage payment (1980 $)	3,550,422	10,480,788	11,413,140	12,931,680	14,087,040	12.39	2.13
Construction							
Average monthly wage (1980 $)	2,625	2,859	3,114	3,367	3,695	1.72	1.73
Change from baseline							
Number of employees	553	145	205	237	226	-9.45	0.98
Total wage payment (1980 $)	1,451,625	414,555	638,370	797,979	835,070	-7.89	2.72
Manufacturing							
Average monthly wage (1980 $)	893	973	1,060	1,154	1,257	1.73	1.72
Change from baseline							
Number of employees	21	48	65	73	69	11.96	0.60
Total wage payment (1980 $)	18,753	46,704	68,900	84,242	86,733	13.90	2.33
Transportation, Communications, and Utilities							
Average monthly wage (1980 $)	1,879	2,047	2,296	2,501	2,724	2.02	1.72
Change from baseline							
Number of employees	51	119	166	188	181	12.53	0.87
Total wage payment (1980 $)	95,829	243,593	381,136	470,188	493,044	14.80	2.61
Wholesale and Retail Trade							
Average monthly wage (1980 $)	844	919	1,002	1,091	1,188	1.73	1.72
Change from baseline							
Number of employees	299	674	934	1,048	1,004	12.06	0.73
Total wage payment (1980 $)	252,356	619,406	935,868	1,143,368	1,192,752	14.00	2.46

Table 5.3 (Cont'd)

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Finance, Insurance, and Real Estate							
Average monthly wage (1980 $)	925	1,007	1,097	1,195	1,302	1.72	1.73
Change from baseline							
Number of employees	43	102	144	166	158	12.85	0.93
Total wage payment (1980 $)	39,775	102,714	157,968	198,370	205,716	14.79	2.68
Services							
Average monthly wage (1980 $)	767	835	910	991	1,079	1.72	1.72
Change from baseline							
Number of employees	190	449	645	747	712	13.00	0.99
Total wage payment (1980 $)	145,730	374,915	586,950	740,277	768,248	14.95	2.73
Government							
Average monthly wage (1980 $)	931	1,014	1,144	1,246	1,357	2.08	1.72
Change from baseline							
Number of employees	300	684	1,061	1,305	1,248	13.46	1.64
Total wage payment (1980 $)	279,300	693,576	1,213,784	1,626,030	1,693,536	15.83	3.39
Nonfarm Proprietors (NFP)							
Average monthly wage (1980 $)	1,230	1,340	1,459	1,590	1,731	1.72	1.72
Change from baseline							
Number of employees	206	471	654	736	704	12.25	0.74
Total wage payment (1980 $)	253,380	631,140	954,186	1,170,240	1,218,624	14.18	2.48
Other Labor Income (OLI)							
Average monthly wage (1980 $)	106	115	126	137	149	1.74	1.69
Change from baseline							
Labor force	3,309	6,856	8,334	9,140	8,942	9.68	0.71
Total OLI (1980 $)	350,754	788,440	1,050,084	1,252,180	1,332,358	11.59	2.41

Table 5.3 (Cont'd)

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Average property income (1980 $)	141	156	170	185	202	1.89	1.74
Population	6,259	14,208	19,778	22,194	21,259	12.19	0.72
Total property income (1980 $)	882,519	2,216,448	3,362,260	4,105,890	4,294,318	14.31	2.48
Total monthly personal income (1980 $)	7,320,443	16,612,279	20,762,646	24,520,444	26,207,439	10.99	2.36
Average monthly per capita income (1980 $)	1,170	1,169	1,050	1,105	1,233	-1.08	1.62

[a]The number of employees by economic sector presented in this table may not equal the total economic sector employment presented in Tables 5.10 and 5.11 because these personal income projections may include communities that are not in the critical impact area (i.e., communities that do not satisfy the 5% growth criteria).

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

In Table 5.3 the highest average monthly wage in the economic sectors would be the $3,695 paid to contract construction workers in 2005. Due to the projected decrease in employment growth, however, the total wages paid in 2005, as a result of the other energy projects, would be at least 42% lower than that paid in 1985 ($835,070 in 2005 compared to $1,451,625 in 1985). The greatest growth in total wage payment in 2005 would be in mining, where the 4,640 additional employees would receive a total of $14,087,040. The next largest amount of income growth would occur in the total property income category, with a figure of almost $4.3 million above the baseline in 2005.

Total wage payment in wholesale and retail trade, nonfarm proprietors, government, and other labor income would amount to between $1.1 million and $1.7 million above the baseline in each sector by 2005. The average monthly wage paid in government would increase by 2.08% annually from 1985 to 1995 -- the highest rate of increase for any sector. The transportation, communications, and utilities sector would also have an annual increase in monthly wages greater than 2% annually during this period.

The total wage payment in the finance, insurance, and real estate sector; the transportation, communications, and utilities sector; the manufacturing sector; the construction sector; and the services sector would each be less than $1 million in 2005.

In all sectors, the fastest growth in the total area wage is realized during the 1985-1995 period. These gains would be due predominantly to the increased employment in the two-county area.

5.2.2 Limited Development Scenario

The projected socioeconomic impacts of the limited development scenario of the other energy projects are described in this section. These impacts are presented by category and window year in Table 5.4. All of these projections are presented as a change from the baseline projections for each window year. Table 5.5 indicates the projected impact on areawide income by sector. A discussion of the areawide impact of this scenario follows.

Total population in the area under study is projected to rise from 4,473 above the baseline in 1985 to 19,159 above it in 2005, as a result of the other energy projects incorporated in the limited development scenario. School-age population would undergo a similar rate of growth, rising to 5,769 above the baseline in 2005, a level almost seven times the school-age population projected for 1985. The greatest growth for each of these population categories would occur between 1985 to 1995, when annual increases are projected to exceed 14%. Slower rates of change would occur from 1995 to 2005 in these two categories and also in retirement-age population, as annual increases would drop below 3%.

Table 5.4 Summary of Areawide Socioeconomic Impacts, by Category and Window Year, for the Limited Development Scenario

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985–2005	1985–1995	1995–2005
Population Growth								
Total	4,473	12,638	17,634	19,952	19,159	4.28	14.70	0.83
School-age	844	2,470	4,628	6,232	5,769	6.84	18.55	2.23
Retirement-age	100	579	714	781	718	7.18	21.72	0.06
Employment Growth (no. of jobs)	2,415	6,102	7,460	8,231	8,065	3.34	11.94	0.78
Household Growth	1,537	4,118	5,295	5,767	5,585	3.63	13.17	0.53
Infrastructure Requirements								
Housing								
Single-family units	922	2,470	3,177	3,461	3,351	3.63	13.17	0.53
Multifamily units	230	618	794	865	837	3.64	13.19	0.53
Mobile homes	385	1,030	1,324	1,442	1,397	3.63	13.15	0.54
Education								
Students	844	2,470	4,628	6,232	5,769	6.84	18.55	2.23
Classrooms	34	99	186	250	231	6.79	18.52	2.19
Teachers	34	99	186	250	231	6.79	18.52	2.19
Health Care								
Hospital beds								
General care	9	25	35	40	38	4.22	14.55	0.83
Long-term care	4	23	29	32	28	7.00	21.91	-0.35
Medical personnel								
Doctors	2	7	11	12	12	6.00	18.59	0.87
Dentists	2	6	8	10	10	5.00	14.87	2.26
Nurses	8	21	30	34	33	4.13	14.13	0.96
Public health nurses	1	2	3	4	4	4.00	11.61	2.92
Mental health care								
Clinical psychologists	0	1	1	1	1	a	a	0
Mental health workers	0	1	2	2	2	a	a	0
Public Safety								
Law enforcement								
Police officers	9	25	35	40	38	4.22	14.55	0.83
Patrol cars	9	25	35	40	38	4.22	14.55	0.83
Jail space (sq ft)	2,237	6,319	8,817	9,976	9,580	4.28	14.70	0.83
Juvenile holding cells	1	2	2	2	2	2.00	7.18	0
Fire Protection								
Fire hydrant flow (gpm)/ duration (hr)[c]	–	–	–	–	–	–	–	–
Emergency Medical Service								
Ambulances	1	2	3	4	4	4.00	11.61	2.92
Emergency medical technicians	7	14	21	28	28	4.00	11.61	2.92
Utility Service Demands								
Water system								
Connections	1,443	4,078	5,688	6,437	6,180	4.28	14.70	0.83
Supply (10^6 gal/ d)	2.31	6.53	9.10	10.30	9.89	4.28	14.69	0.84
Storage (10^6 gal/ d)	1.16	3.26	4.55	5.15	4.94	4.26	14.65	0.83
Treatment (10^6 gal/ d)	2.31	6.53	9.10	10.30	9.89	4.28	14.69	0.84
Sewage system (10^6 gal/ d)	0.45	1.27	1.76	1.99	1.92	4.27	14.61	0.87
Solid waste[d]								

Table 5.4 (Cont'd)

Socioeconomic Development Category	Change from Baseline, by Year					Cumulative Growth Factor[a]	Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-2005	1985-1995	1995-2005
Other Services								
Parks (acres)	27	76	105	120	115	4.26	14.55	0.91
Libraries								
Books	8,946	25,276	35,268	39,904	38,318	4.28	14.70	0.83
Space (sq ft)	2,237	6,319	8,817	9,976	9,580	4.28	14.70	0.83

[a]Computed as ratio between 1985 and 2005.

[b]Undefined.

[c]Fire protection measured in fire hydrant flow (gpm)/ duration (hr) cannot be aggregated across the affected counties. See Tables 5.18 and 5.19 for county-specific detail.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid-waste disposal impacts could not be determined.

Areawide employment is also expected to experience rapid increases as a result of the limited development scenario, especially from 1985 to 1995. During this period, employment is projected to increase by 12% each year, compared to a rate of 0.8% annually between 1995 and 2005. By 2005, employment due to the other energy projects included in the limited development scenario is expected to reach a level of 8,065 above the baseline.

The number of households would also grow at a substantial rate. In 2005, there are expected to be 5,585 more households as a result of other energy developments than the baseline projections would predict. From 1,537 households above the baseline in 1985, the number of households would increase by more than 13% annually through 1995, and then increase by 0.53% each year through the end of the study period.

The growth in the demand for housing would follow the same pattern as those development categories already discussed. Rapid growth in housing demand would occur during the first 10 years (around 13% each year) followed by slower growth thereafter (0.5% annually, 1995-2005). Single-family housing would remain the dominant form, reaching a level of 3,351 units above the baseline in 2005. Mobile homes would be 1,397 above the baseline and multi-family units 837 above it in 2005.

Demands on the education system resulting from the limited development scenario projects would be similar to those already discussed. The number of students in the system is projected to increase at approximately the same rate as the number of teachers or classrooms. The number of students would rise from a level 844 above the baseline in 1985 to a level 5,769 above it in 2005 -- an increase by a factor of almost 7. The numbers of teachers and classrooms would also increase by a factor of 7. This would be a growth of 25 students for every teacher, an acceptable standard in the area.

Increases in health care produced by the limited development scenario would be less than those in other categories. Both general care and long-term hospital beds would increase by between 14% and 22% per year from 1985 to 1995. In all, there would be 66 more hospital beds in the area in 2005, compared to 13 more in 1985. Similar increases are expected in the number of medical personnel. The number of doctors would increase from 2 in 1985 to 12 in 2005, the largest increase of medical personnel. The number of nurses would increase from 8 above the baseline in 1985 to 33 above it in 2005. Little change is projected in the amount of mental health care available in the area.

Projected increases in public safety, due to the scenario developments, would be similar to those described for health care services. The number of police officers and patrol cars would rise to a level of 38 above the baseline in 2005. The amount of jail space would expand at about the same rate, increasing by a factor of more than four over the 20-year period. In 2005, there would be two more juvenile holding cells than the baseline would project. Increases of 300% would occur in the emergency medical services.

Utilities, park, and library services would undergo identical increases. All of these services would expand by at least 14.5% per year from 1985 to 1995, and by 0.8% or more annually thereafter. This would result in service demand levels in 2005 more than 4.2 times greater than the comparable 1985 levels.

Areawide Impact on Total Wages and Personal Income

The total area wage and personal income effects of the scenario are presented in Table 5.5. The wage and income data are presented by economic sector and income category. All sectors were assumed to have an approximate annual increase in monthly wages of 1.72% unless otherwise noted. Furthermore, wages in all sectors, unless identified, would increase by 40% over the 20-year period.

Total wage payment under this scenario would follow trends identical to the impacts under the maximum development scenario. Mining would again experience the greatest growth, with a total wage of $12,717,804 above the baseline in 2005. Total property income would be more than $3.8 million above the baseline in 2005. Total wages between $1 million and $2 million above the baseline would be paid in each of the following sectors: wholesale and retail trade, government, nonfarm proprietors, and other labor income. Total wage payment would be less than $1 million above the baseline in each of the remaining sectors.

Again, the fastest growth would occur between 1985 and 1995 as a result of the growth in employment.

Table 5.5 Total Areawide Wage and Personal Income Impact Projections, by Economic Sector, as a Result of the Limited Development Scenario[a]

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Mining							
Average monthly wage (1980 $)	2,157	2,517	2,559	2,787	3,036	1.72	1.72
Change from baseline							
Number of employees	1,565	3,714	4,009	4,189	4,189	9.86	0.44
Total wage payment (1980 $)	3,375,705	9,348,138	10,259,031	11,674,743	12,717,804	11.76	2.17
Construction							
Average monthly wage (1980 $)	2,625	2,859	3,114	3,367	3,695	1.72	1.73
Change from baseline							
Number of employees	45	129	183	213	204	15.06	1.09
Total wage payment (1980 $)	118,125	368,811	569,862	717,171	753,780	17.04	2.84
Manufacturing							
Average monthly wage (1980 $)	893	973	1,060	1,154	1,257	1.73	1.72
Change from baseline							
Number of employees	16	43	59	66	63	13.94	0.66
Total wage payment (1980 $)	14,288	41,839	62,540	76,164	79,191	15.91	2.39
Transportation, Communications, and Utilities							
Average monthly wage (1980 $)	1,879	2,047	2,296	2,501	2,724	2.02	1.72
Change from baseline							
Number of employees	37	106	148	169	163	14.87	0.97
Total wage payment (1980 $)	69,523	216,982	339,808	422,669	444,012	17.20	2.71
Wholesale and Retail Trade							
Average monthly wage (1980 $)	844	919	1,002	1,091	1,188	1.73	1.72
Change from baseline							
Number of employees	217	600	832	941	903	14.38	0.82
Total wage payment (1980 $)	183,148	551,400	833,664	1,026,631	1,072,764	16.36	2.55

Table 5.5 (Cont'd)

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Finance, Insurance, and Real Estate							
Average monthly wage (1980 $)	925	1,007	1,097	1,195	1,302	1.72	1.73
Change from baseline							
Number of employees	32	91	129	149	143	14.96	1.04
Total wage payment (1980 $)	29,600	91,637	141,513	178,055	186,186	16.94	2.78
Services							
Average monthly wage (1980 $)	767	835	910	991	1,079	1.72	1.72
Change from baseline							
Number of employees	138	399	575	672	642	15.34	1.11
Total wage payment (1980 $)	105,846	333,165	523,250	665,952	692,718	17.33	2.85
Government							
Average monthly wage (1980 $)	931	1,014	1,144	1,246	1,357	2.08	1.72
Change from baseline							
Number of employees	215	601	942	1,171	1,124	15.92	1.78
Total wage payment (1980 $)	200,165	609,414	1,077,648	1,459,066	1,525,268	18.33	3.53
Nonfarm Proprietors (NFP)							
Average monthly wage (1980 $)	1,230	1,340	1,459	1,590	1,731	1.72	1.72
Change from baseline							
Number of employees	150	419	583	661	634	14.54	0.84
Total wage payment (1980 $)	184,500	561,460	850,597	1,050,990	1,097,454	16.51	2.58
Other Labor Income (OLI)							
Average monthly OLI (1980 $)	106	115	126	137	149	1.74	1.69
Change from baseline							
Labor force	2,415	6,102	7,460	8,231	8,065	11.94	0.78
Total OLI (1980 $)	255,990	701,730	939,960	1,127,647	1,201,685	13.89	2.49

Table 5.5 (Cont'd)

Economic Sector and Income Categories	Wages and Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Average property income (1980 $)	141	156	170	185	202	1.89	1.74
Population	4,473	12,638	17,634	19,952	19,159	14.70	0.83
Total property income (1980 $)	630,693	1,971,528	2,997,780	3,691,120	3,870,118	16.87	2.59
Total monthly personal income (1980 $)	5,167,583	14,796,104	18,595,653	22,090,208	23,640,980	13.66	2.43
Average monthly per capita Income (1980 $)	1,155	1,171	1,055	1,107	1,234	-0.90	1.58

[a]The number of employees by economic sector presented in this table may not equal the total economic sector employment presented in Tables 5.12 and 5.13 because these personal income projections may include communities that are not in the critical impact area (i.e., communities that do not satisfy the 5% growth criteria).

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

5.3 LOCAL SOCIOECONOMIC IMPACT ANALYSIS OF THE OTHER ENERGY PROJECT DEVELOPMENT SCENARIOS

The county-level socioeconomic impacts that would potentially arise from the development of the other energy project scenarios are addressed in this section. The same two assumptions underlie these projections of socioeconomic impacts as those used in projecting the situation of the two-county area: that the baseline projections (described in Sec. 2) would accurately reflect the socioeconomic composition of the counties in the time period under study, and that the manpower requirements of each project and scenario (described in Sec. 5.1) would not change.

Given these two assumptions, the following county-level analysis is based on the difference between the baseline projections and the projected impacts of the other energy development scenarios.

Impacts under each of the two development scenarios are discussed separately. Population, household, economic base, employment, and infrastructure impacts are discussed. In each instance, the impacts are presented in terms of the difference between the baseline projections and the scenario being discussed.

5.3.1 Population and Housing Impacts

Figure 5.2 illustrates the change in population that would occur in each county as a result of the other energy development scenarios. A summary of the population and household impacts in each county by scenario is presented in Table 5.6. Details of the population and household impacts by CCD and community are shown in Tables 5.7 and 5.8 for each scenario.

Maximum Development Scenario

Population growth would occur in Carbon County and in Emery County until the year 2000, after which population is forecast to decline in both counties until 2005. Both counties would experience a similar pattern of growth and decline in the number of new households during this time. Data are shown in Tables 5.6 and 5.7. Details of the county trends are described below.

Carbon County. Carbon County is projected to experience the greatest growth due to the maximum development scenario (see Fig. 5.2). Population would reach a total 20,105 above the baseline in 2005, compared to 5,605 above it in 1985. The fastest growth is expected to occur between 1985 and 1990, when annual increases would average 19.03%. A similar rate of increase is forecast for this period in terms of school-age population and households. All population categories except the school-age category would realize

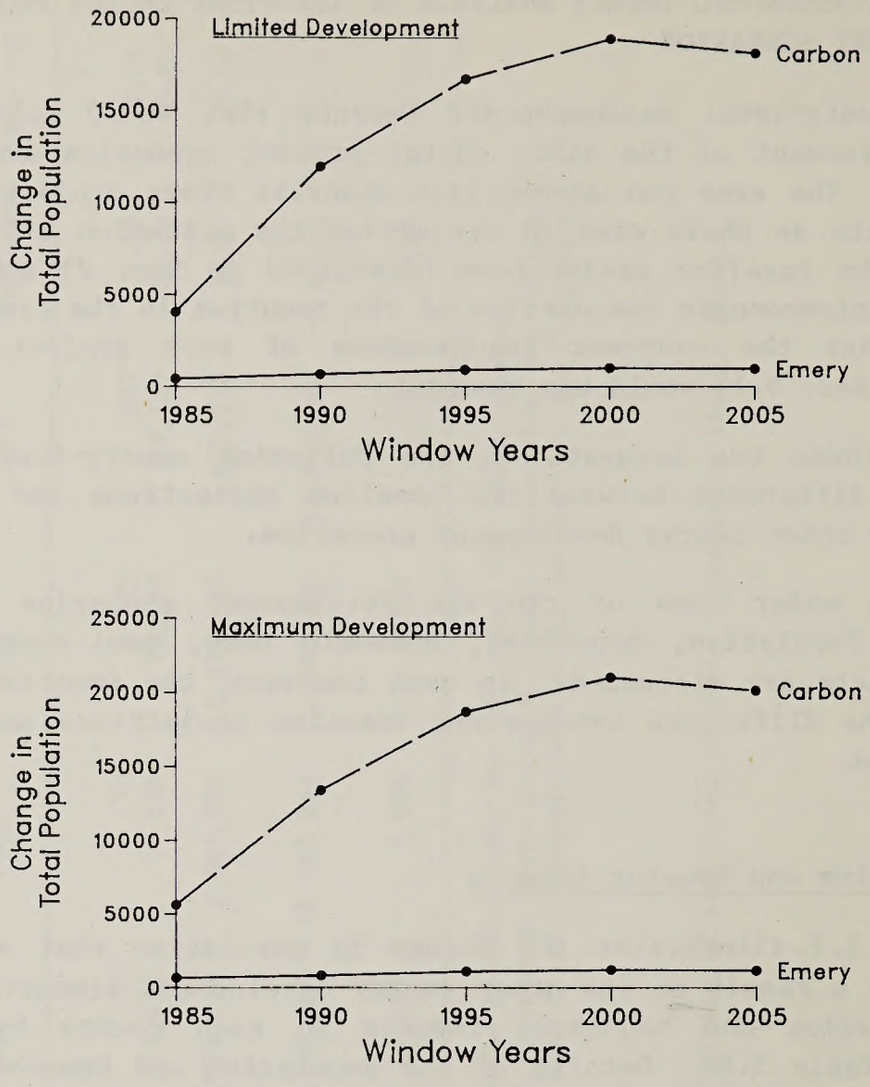


Fig. 5.2 Change in Population by County Due to the Two Other Energy Project Development Scenarios

substantially lower growth rates after 1990. The additional retirement-age population would grow from 105 in 1985 to 751 in 2005.

The greatest proportion of the population growth would occur in the Price CCD, where the change in population would grow from 4,554 additional people in 1985 to 16,038 in 2005. The city of Price would account for almost two-thirds of this growth, as population would rise to 10,425 above the baseline in 2005. Wellington and the unincorporated areas would account for about equal amounts of growth, reaching population levels of 2,887 and 2,727 above the baseline, respectively, in 2005. The city of East Carbon would compose almost three-fourths of the total population growth in the East Carbon CCD, accounting for 1,576 of the total growth of 2,130 in 2005. The Helper CCD is projected to be the slowest growing area, as population would rise to only 1,937 above the baseline in 2005. The city of Helper and the unincorporated areas would be the locations for all of this projected population growth.

Table 5.6 Summary of Population and Household Impact Projections by County and Development Scenario (1985-2005)

Scenario, County, and Window Years	Population		New Households		School-Age Population		Retirement-Age Population	
	Change from Baseline	Average Annual % Change[a]	Change from Baseline	Average Annual % Change[a]	Change from Baseline	Average Annual % Change[a]	Change from Baseline	Average Annual % Change[a]
Maximum Development								
Carbon County								
1985	5,605	-	1,961	-	1072	-	105	-
1990	13,393	19.03	4,338	17.21	2,660	19.93	607	42.04
1995	18,683	6.88	5,585	5.18	4,922	13.10	748	4.27
2000	20,991	2.36	6,049	1.61	6,563	5.92	813	1.68
2005	20,105	-0.86	5,850	-0.67	6,076	-1.53	751	-1.57
Emery County								
1985	654	-	230	-	120	-	12	-
1990	815	4.50	263	2.72	163	6.32	38	25.93
1995	1,095	6.08	326	4.39	291	12.29	45	3.44
2000	1,203	1.90	346	1.20	379	5.43	47	0.87
2005	1,154	-0.83	335	-0.64	360	-1.02	43	-1.76
Limited Development								
Carbon County								
1985	4,056	-	1,394	-	770	-	90	-
1990	11,966	24.16	3,899	22.84	2,339	24.88	547	43.47
1995	16,728	6.93	5,023	5.20	4,389	13.41	676	4.33
2000	18,946	2.52	5,476	1.74	5,915	6.15	741	1.85
2005	18,191	-0.81	5,303	-0.64	5,468	-1.56	682	-1.65
Emery County								
1985	417	-	143	-	74	-	10	-
1990	672	10.01	219	8.90	131	12.10	32	26.19
1995	906	6.16	272	4.43	239	12.78	38	3.50
2000	1,006	2.12	291	1.36	317	5.81	40	1.03
2005	968	-0.77	282	-0.63	301	-1.03	36	-2.09

[a]Computed as average annual compound percent change from previous window year.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

Throughout the county, the number of households would increase until the year 2000. From 1985 to 1990 the annual growth rate is projected to be 17.21%, followed by a much slower growth rate of about 5% annually to 1995, 1.6% to the year 2000, and then followed by a decline of 0.67% by the year 2005.

Emery County. Population in Emery County is forecast to follow a similar trend as in Carbon County. However, the most rapid growth would occur between 1990 and 1995, as total population, households, and school-age population would increase by 4% to 12% annually. The following five-year period, however, would be characterized by a slower annual increase in these categories, of 1% to 5.4%. Decreases are then projected to occur during the final five years of the study period, so that in all cases, the population level in 2000 represents the peak growth in the period. Total population

Table 5.7 Population and Household Impact Projections by Community for Carbon and Emery Counties -- Maximum Development Scenario[a]

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year				
	1985	1990	1995	2000	2005
Carbon County					
East Carbon Census County Division (CCD)					
East Carbon CCD Total					
Population	667	1,646	2,072	2,199	2,130
Households	239	528	614	630	618
East Carbon					
Population	494	1,218	1,533	1,627	1,576
Households	177	391	455	466	457
Sunnyside					
Population	173	428	539	572	554
Households	62	138	160	164	161
Unincorporated Areas					
Population	0	0	0	0	0
Helper Census County Division (CCD)					
Helper CCD Total					
Population	384	946	1,587	1,989	1,937
Households	135	308	475	574	564
Helper					
Population	230	568	953	1,193	1,162
Households	81	184	285	344	339
Scofield					
Population	0	0	0	0	0
Unincorporated Areas					
Population	154	379	634	796	775
Households	54	123	190	229	225

Table 5.7 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year				
	1985	1990	1995	2000	2005
Price Census County Division (CCD)					
Price CCD Total					
Population	4,554	10,800	15,024	16,803	16,038
Households	1,587	3,502	4,495	4,845	4,668
Price					
Population	2,960	7,020	9,765	10,922	10,425
Households	1,032	2,277	2,922	3,149	3,034
Wellington					
Population	820	1,944	2,705	3,024	2,887
Households	286	630	809	872	841
Hiawatha					
Population	0	0	0	0	0
Unincorporated Areas					
Population	774	1,836	2,554	2,857	2,727
Households	270	595	764	824	793
Emery County					
Castle Dale-Huntington Census County Division (CCD)					
Castle Dale-Huntington CCD Total					
Population	526	644	875	966	924
Households	185	207	263	279	268
Castle Dale					
Population	184	225	306	337	323
Households	64	72	91	97	93
Cleveland					
Population	31	40	53	58	56
Households	11	12	16	17	17
Elmo					
Population	21	24	35	38	37
Households	7	8	11	11	11

Table 5.7 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year				
	1985	1990	1995	2000	2005
Huntington					
Population	132	161	219	242	231
Households	47	52	66	70	67
Orangeville					
Population	132	161	219	242	231
Households	47	52	66	70	67
Unincorporated Areas					
Population	26	33	42	49	46
Households	9	11	13	14	13
Green River Census County Division (CCD)					
Green River CCD Total					
Population	83	82	103	109	105
Households	30	26	30	32	30
Green River					
Population	71	71	89	93	91
Households	26	23	26	27	26
Unincorporated Areas					
Population	12	11	14	16	14
Households	4	3	4	5	4
Emery-Ferron Census County Division (CCD)					
Emery-Ferron CCD Total					
Population	46	89	118	130	126
Households	15	28	36	37	37
Clawson					
Population	0	0	0	0	0
Emery					
Population	12	23	30	33	32
Households	4	7	9	9	9

Table 5.7 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year				
	1985	1990	1995	2000	2005
Ferron					
Population	34	66	88	97	94
Households	11	21	27	28	28
Unincorporated Areas					
Population	0	0	0	0	0

[a]Totals may not add due to rounding.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

rises to 1,203 above the baseline in 2000, or less than 6% of the peak growth projected for Carbon County in the year 2000.

The Castle Dale-Huntington CCD is projected to undergo the greatest proportion of population growth projected for the county, composing over 80% of the total county population growth in 2005. Castle Dale, Huntington, and Orangeville would combine to account for 85% of the 924 additional people in the CCD in 2005. The Green River CCD would be the smallest of the three CCDs in the county by the year 2005, contributing only 105 additional people to the total population growth in 2005. The town of Green River would account for 87% of this population growth projected for the CCD. The Emery-Ferron CCD would have the smallest increase of the CCDs in Emery County in 1985; however, by 1990 it would become the second largest CCD in the county.

Limited Development Scenario

Under this scenario, increases are projected for each population division and for households until 2000. Carbon County would achieve greater growth than Emery County; in 2005, there are expected to be 18,191 additional people in Carbon County, compared to 968 in Emery (see Fig. 5.2). Details are presented in Tables 5.6 and 5.8.

Carbon County. Population in Carbon County is projected to rise from 4,056 above the baseline in 1985 to 18,191 above it in 2005. The most rapid

Table 5.8 Population and Household Impact Projections by Community for Carbon and Emery Counties -- Limited Development Scenario[a]

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year				
	1985	1990	1995	2000	2005
Carbon County					
East Carbon Census County Division (CCD)					
East Carbon CCD Total					
Population	246	1,190	1,476	1,580	1,543
Households	85	388	443	457	450
East Carbon					
Population	182	881	1,092	1,169	1,142
Households	63	287	328	338	333
Sunnyside					
Population	64	309	384	411	401
Households	22	101	115	119	117
Unincorporated Areas					
Population	0	0	0	0	0
Helper Census County Division (CCD)					
Helper CCD Total					
Population	250	863	1,481	1,880	1,833
Households	86	282	445	543	534
Helper					
Population	150	518	889	1,128	1,100
Households	52	169	267	326	321
Scofield					
Population	0	0	0	0	0
Unincorporated Areas					
Population	100	346	592	752	733
Households	34	113	178	217	213

Table 5.8 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year				
	1985	1990	1995	2000	2005
Price Census County Division (CCD)					
Price CCD Total					
Population	3,560	9,912	13,771	15,486	14,815
Households	1,223	3,229	4,135	4,476	4,319
Price					
Population	2,314	6,443	8,951	10,066	9,630
Households	795	2,099	2,688	2,909	2,807
Wellington					
Population	641	1,784	2,479	2,787	2,667
Households	220	581	744	806	778
Hiawatha					
Population	0	0	0	0	0
Unincorporated Areas					
Population	605	1,685	2,341	2,633	2,519
Households	208	549	703	761	734
Emery County					
Castle Dale-Huntington Census County Division (CCD)					
Castle Dale-Huntington CCD Total					
Population	368	532	727	812	779
Households	127	173	219	235	227
Castle Dale					
Population	129	186	254	284	272
Households	44	61	76	82	79
Cleveland					
Population	22	32	44	49	47
Households	8	10	13	14	14
Elmo					
Population	15	21	29	32	31
Households	5	7	9	9	9

Table 5.8 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year				
	1985	1990	1995	2000	2005
Huntington					
Population	92	133	182	203	195
Households	32	43	55	59	57
Orangeville					
Population	92	133	182	203	195
Households	32	43	55	59	57
Unincorporated Areas					
Population	18	27	35	41	39
Households	6	9	11	12	11
Green River Census County Division (CCD)					
Green River CCD Total					
Population	6	53	65	69	67
Households	2	17	20	20	20
Green River					
Population	5	46	56	59	58
Households	2	15	17	17	17
Unincorporated Areas					
Population	1	7	9	10	9
Households	0	2	3	3	3
Emery-Ferron Census County Division (CCD)					
Emery-Ferron CCD Total					
Population	44	87	115	127	123
Households	15	28	35	36	36
Clawson					
Population	0	0	0	0	0
Emery					
Population	11	22	29	32	31
Households	4	7	9	9	9

Table 5.8 (Cont'd)

Geographic Area and Impact Category	Change from Baseline Population and Households, by Year				
	1985	1990	1995	2000	2005
Ferron					
Population	33	65	86	95	92
Households	11	21	26	27	27
Unincorporated Areas					
Population	0	0	0	0	0

[a]Totals may not add due to rounding.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

growth would occur between 1985 and 1990, with annual increases expected to average 24.2%. Households and school-age population are expected to follow these same trends. Population and household growth is forecast to increase until the year 2000.

As before, the Price CCD is projected to experience the most population growth during the period 1985-2005. In 2005, there are projected to be 14,815 more people as a result of the other energy projects included in the limited development scenario in the Price CCD. Of these, 9,630 would be located in the city of Price, while Wellington and the unincorporated areas would account for the remainder. The East Carbon CCD is projected to have 1,543 additional people in 2005, with 1,142 of these located in the town of East Carbon. There would be no additional population in the unincorporated areas in this CCD. The Helper CCD would grow by about the same amount in 1985 as the East Carbon CCD, but by 1995 the Helper CCD would be the second largest CCD in the county, with 1,833 additional people expected in 2005. The town of Helper would grow by 1,100, while the unincorporated areas would grow by 733. Scofield would experience no population growth under this scenario.

Household impacts would follow the same trends as population; Price CCD would experience the most impact, while East Carbon CCD and Helper CCD would be moderately affected.

Emery County. Population in Emery County is projected to grow from 417 above the baseline in 1985 to 968 above it in 2005 as a result of the limited

development scenario. This increase is much less than the growth predicted for Carbon County (see Fig. 5.2). Households and total population are projected to grow the fastest between 1985 and 1990, with annual rates of increase of 9% to 10%. School-age population is the only category that would experience its latest growth from 1990 to 1995.

The Castle Dale-Huntington CCD would easily be the fastest growing area, accounting for more than 80% of the population growth in the county. By 2005, it is projected that there will be 779 additional people in the Castle Dale-Huntington CCD, 272 in Castle Dale and 195 each in Huntington and Orangeville. Cleveland, Elmo, and the unincorporated areas would realize only slight population growth as a result of this scenario. The Emery-Ferron CCD is forecast to have the second largest increase of the three CCDs. Population for this CCD would rise from 44 in 1985 to 123 in 2005. Ferron would account for 92 of those additional 123 people, while the rest would be in Emery. There would be no increase in Clawson or the unincorporated areas. The Green River CCD is forecast to have 67 additional people in 2005, compared to only six in 1985. Most of this growth is expected to occur in the town of Green River, where population would rise to 58 above the baseline in 2005. Population in the unincorporated areas would increase by only 9 people over the period.

The number of households is expected to grow in the same manner as population. By the year 2005, Emery County is projected to add 282 households, with 227 of these in the Castle Dale-Huntington CCD, 20 in the Green River CCD, and 36 in the Emery-Ferron CCD.

5.3.2 Economic Base and Employment Impacts

This section describes the potential economic changes in Carbon and Emery counties as a result of the other energy developments proposed for the area. The impacts resulting from each of the two scenarios are discussed separately. Employment growth by county and sector is assessed, and total personal income and per capita income are projected.

Total Employment Impacts by Scenario and County

Table 5.9 presents the employment impacts by county that are projected to result under each development scenario. These impacts are illustrated graphically in Fig. 5.3. Impacts on employment resulting from the other energy development scenarios are presented as a change from the baseline employment projections.

Maximum Development Scenario. Under this scenario, total employment growth in the region is projected to reach 8,942 in the year 2005. More than 90% of this growth is expected to occur in Carbon County, where additional

Table 5.9 Summary of Total Employment Impacts, by County, Resulting From Each Development Scenario

Scenario and County	Change from Baseline Employment, by Year (number of workers)					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Maximum Development							
Carbon County	2,977	6,099	7,512	8,288	8,100	9.70	0.76
Emery County	332	757	822	852	842	9.49	0.24
Limited Development							
Carbon County	2,119	5,366	6,671	7,413	7,255	12.15	0.84
Emery County	296	736	789	818	810	10.30	0.26

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

employment is projected to rise from 2,977 in 1985 to 8,100 in 2005. The fastest growth would be realized between 1985 and 1995, when employment is projected to increase by 9.70% annually; this rate would become 0.76% annually from 1995 to 2005. Emery County is expected to undergo about the same rate of increase in employment; however, it is only projected to reach a level of 842 workers above the baseline in 2005. Yearly increases from 1985 to 1995 would be 9.49%, and from 1995 to 2005 0.24%, in Emery County.

Limited Development Scenario. Total employment growth in the area is projected to be 8,065 in the year 2005 under the limited development scenario. Carbon County would account for the bulk of this growth (90%), with additional employment rising from 2,119 in 1985 to 7,255 in 2005 (see Fig. 5.3). Again, the most rapid growth would occur from 1985 to 1995: average annual increases between 1985 and 1995 would be 12.15%, whereas between 1995 and 2005 they would be 0.84%. Emery County would have 296 additional workers in 1985 and 810 additional workers in the year 2005. Over the 10 years from 1985 to 1995, the average annual rate of increase would be 10.30%. For the last 10 years of the study period, the yearly increase would average 0.26%.

Employment Impacts by Scenario and Economic Sector

Tables 5.10-5.13 present the employment impacts forecast to result within each county by economic sector. The impacts that would occur under

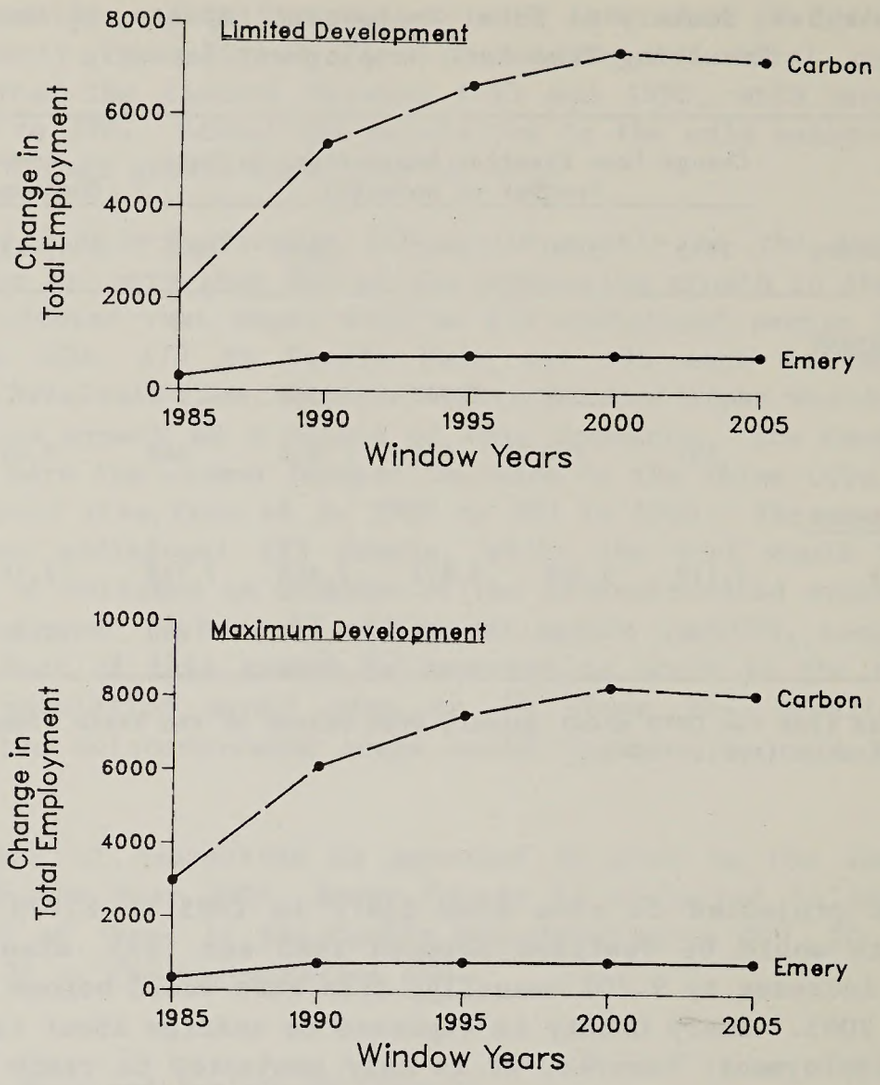


Fig. 5.3 Change in County Employment Levels Due to the Other Energy Project Development Scenarios

each of the two scenarios are discussed separately. All of the impacts are presented as a change from the baseline conditions.

Maximum Development Scenario. Table 5.10 illustrates that Carbon County would realize a significant increase in employment in all economic sectors except agriculture. Most of the employment growth is projected to occur in mining, which would add 4,037 workers in 2005, compared to the 1,419 added in 1985. Contract construction employment would peak at 546 workers above the baseline in 1985, then decreasing to 214 above the baseline in 2005. Employment in most other sectors is expected to increase significantly, especially in the period 1985-1995. During this time, average annual increases in most of these sectors would be between 12% and 14%. In the following 10 years, these growth rates would drop to between 0.6% and 1.6%

Table 5.10 Changes in Carbon County Employment Resulting from the Maximum Development Scenario[a]

Industry Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	1,419	3,561	3,857	4,037	4,037	10.52	0.46
Contract Construction	546	137	194	224	214	-9.83	0.99
Manufacturing	20	46	63	71	67	12.16	0.62
Transportation, Communication, and Utilities	43	105	146	166	159	13.00	0.86
Wholesale and Retail Trade	273	638	883	992	950	12.46	0.73
Finance, Insurance, and Real Estate	40	99	139	161	153	13.26	0.96
Services	178	431	621	720	686	13.31	1.00
Government	275	649	1,007	1,238	1,184	13.86	1.63
Nonfarm Proprietors	183	433	602	679	650	12.65	0.77
Total	2,977	6,099	7,512	8,288	8,100	9.70	0.76

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

annually. In Carbon County, the government sector is projected to experience employment growth second only to mining, with government employment in 2005 expected to be 1,184 above the baseline.

Emery County would realize considerably less growth in employment over the period 1985-2005. Like Carbon County, Emery County employment in the mining sector would experience the largest growth, reaching a peak of 603 additional employees by 1990 and continuing at that level throughout the remainder of the period. Sectoral employment in government, trade, and nonfarm proprietors is expected to increase by the greatest amount after mining, reaching levels 64, 54, and 54 above the baseline, respectively, in 2005. All sectors except agriculture are projected to increase by annual rates of up to 1.7% in the period 1995-2005. Details of these trends are presented in Table 5.11.

Table 5.11 Changes in Emery County Employment Resulting from the Maximum Development Scenario[a]

Industry Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	227	603	603	603	603	10.26	0
Contract Construction	7	8	11	13	12	4.62	0.87
Manufacturing	1	2	2	2	2	7.18	0
Transportation, Communication, and Utilities	8	14	20	22	22	9.60	0.96
Wholesale and Retail Trade	26	36	51	56	54	6.97	0.57
Finance, Insurance, and Real Estate	3	3	5	5	5	5.24	0
Services	12	18	24	27	26	7.18	0.80
Government	25	35	54	67	64	8.01	1.71
Nonfarm Proprietors	23	38	52	57	54	8.50	0.38
Total	332	757	822	852	842	9.49	0.24

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

Limited Development Scenario. Carbon County is projected to experience large increases in employment in almost all industrial sectors. Table 5.12 shows that mining would grow the most of all sectors, with 3,586 additional workers expected in 2005. Government and trade would have the second and third greatest numbers of additional workers, respectively. Employment in government would increase from 199 above the baseline in 1985 to 1,069 above it in 2005; employment in trade would rise from 200 above the baseline in 1985 to 857 above it in 2005. Contract construction employment in Carbon County would peak at 202 additional workers in 2000, then decreasing to 194 above the baseline in 2005. Employment in most sectors would increase between 10% and 16% annually from 1985 to 1995. Annual increases for the period 1995-2005 would average between 0.5% and 1.8%.

Emery County would again realize relatively small changes in employment. Employment in the mining, government, and nonfarm proprietors

Table 5.12 Changes in Carbon County Employment Resulting from the Limited Development Scenario[a]

Economic Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	1,338	3,111	3,406	3,586	3,586	9.79	0.52
Contract Construction	41	122	174	202	194	15.55	1.09
Manufacturing	15	41	57	64	61	14.28	0.68
Transportation, Communication, and Utilities	32	93	130	149	143	15.05	0.96
Wholesale and Retail Trade	200	569	789	893	857	14.71	0.83
Finance, Insurance, and Real Estate	30	88	125	145	139	15.34	1.07
Services	130	384	555	649	620	15.62	1.11
Government	199	572	897	1,114	1,069	16.25	1.77
Nonfarm Proprietors	134	386	538	611	586	14.91	0.86
Total	2,119	5,366	6,671	7,413	7,255	12.15	0.84

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

sectors would grow the most relative to other sectors, but no sector except mining would have an employment increase of as many as 55 workers. Very small employment increases are projected to occur in manufacturing; the same is true of the finance, insurance, and real estate sector. From 1985 to 1995, average annual increases for each sector would be between 7.18% and 13.67%, and from 1995 to 2005 the average annual percent change (0% to 2%) is projected to be much slower than that projected for the previous 10 years. Table 5.13 contains the details of these changes.

Personal Income Impact Projections

The total personal income projections are presented by county and scenario in Table 5.14. The projections are based on a forecast of per capita income and population growth. Per capita income for the years 1985-2005 was

Table 5.13 Changes in Emery County Employment Resulting from the Limited Development Scenario[a]

Economic Sector	Change from Baseline Employment, by Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Agriculture	0	0	0	0	0	b	b
Mining	227	603	603	603	603	10.26	0
Contract Construction	4	7	9	11	10	8.45	1.06
Manufacturing	1	2	2	2	2	7.18	0
Transportation, Communication, and Utilities	5	13	18	20	20	13.67	1.06
Wholesale and Retail Trade	17	31	43	48	46	9.72	0.68
Finance, Insurance, and Real Estate	2	3	4	4	4	7.18	0
Services	8	15	20	23	22	9.60	0.96
Government	16	29	45	57	55	10.89	2.03
Nonfarm Proprietors	16	33	45	50	48	10.89	0.65
Total	296	736	789	818	810	10.30	0.26

[a]Totals may not add due to rounding.

[b]Undefined.

Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

derived by aggregating the average monthly wage levels by economic sector and assuming (1) that the personal income component would remain at the same proportion as the national level and (2) that the average annual rate of growth would remain constant.

Maximum Development Scenario. The per capita income levels for the area are shown in the first line of Table 5.14. Per capita income under the maximum development scenario is projected to decline from $14,040 in 1985 to $12,600 in 1995, and then increase to $14,796 in 2005. The annual rate of decline in the first 10 years would be 1.08%, with a 1.62% annual growth rate in the final 10 years.

In Carbon County, the total personal income generated by the maximum development scenario (measured as a change from the baseline income

Table 5.14 Total Personal Income and Per Capita Income Projections by County and Development Scenario

County Population and Income Category	Income and Population Projections, by Scenario and Year					Average Annual Compound Percent Change	
	1985	1990	1995	2000	2005	1985-1995	1995-2005
Maximum Development Scenario							
Per Capita Income (1980 $)	14,040	14,028	12,600	13,260	14,796	-1.08	1.62
Change from baseline, Carbon County							
Population	5,605	13,393	18,683	2,0991	20,105	12.79	0.74
Total personal income (1980 $ x 10^6)	78.69	187.88	235.41	278.34	297.47	11.58	2.37
Change from baseline, Emery County							
Population	654	815	1,095	1,203	1,154	5.29	0.53
Total personal income (1980 $ x 10^6)	9.18	11.43	13.80	15.95	17.07	4.16	2.15
Limited Development Scenario							
Per Capita Income (1980 $)	13,860	14,052	12,660	13,284	14,808	-0.90	1.58
Change from baseline, Carbon County							
Population	4,056	11,966	16,728	18,946	18,191	15.22	0.84
Total personal income (1980 $ x 10^6)	56.22	168.15	211.78	251.68	269.37	14.18	2.43
Change from baseline, Emery County							
Population	417	672	906	1,006	968	8.07	0.66
Total personal income (1980 $ x 10^6)	5.78	9.44	11.47	13.36	14.33	7.09	2.25

[a]Source: adapted from the UPED model output, Utah Office of the State Planning Coordinator (April 1984).

projections) is projected to increase at an annual rate of 11.58% between 1985 and 1995 and by 2.37% annually thereafter. In 2005, total personal income in the county would be $297.47 million above the baseline.

Increases in personal income would be smaller in Emery County. Total personal income is projected to reach a level just $17.07 million above the baseline in 2005. Most of the increase would occur between 1985 and 1995, when total personal income is expected to rise by 4.16% annually. This growth rate drops to 2.15% yearly for the period 1995-2005.

Limited Development Scenario. Per capita income under this scenario is projected to fluctuate throughout the period. From an areawide level of $13,860 in 1985, per capita income is expected to rise to $14,052 in 1990; then decrease to $12,660 in 1995; and then rise again by 2005 to $14,808, the peak level for the 20-year period. Details of these changes are shown in Table 5.14.

Carbon County is again forecast to undergo a very large change in total personal income. In 1985, the additional personal income, projected as a result of the other energy projects proposed under the limited development scenario, would be $56.22 million. This income level would rise to $269.37 million in 2005. The annual rate of change would be 14.18% for the 1985-1995 period and 2.43% thereafter.

Emery County is anticipated to have a much smaller increase in total personal income. Total personal income is forecast to expand by 7.09% annually between 1985 and 1995 and then decline to 2.25% annually for the 1995-2005 period. The level of total personal income due to the limited development scenario projects would be $14.33 million in 2005.

5.3.3 Public and Private Infrastructure Effects

In addition to the effects on population, employment, and income, the other energy projects proposed in the two scenarios would also have a significant impact on the public and private infrastructure of the counties and communities of the area. The cumulative growth factors for infrastructure service demands are presented in Table 5.15 for each county and scenario. The magnitude and duration of infrastructure effects by scenario is depicted for each of the two counties in Tables 5.16-5.19.

Rate of Change in Infrastructure Demands Caused by Other Energy Projects

The following section describes the growth projected for each infrastructure category. Housing is dealt with in more detail because community and CCD impacts are included in the analysis. Tables C.4-C.5 in Appendix C present the change in housing demand by community and CCD for each scenario.

Table 5.15 Infrastructure Service Demand Growth Factors Corresponding to the Two Other Energy Project Development Scenarios

Infrastructure Category	Cumulative Growth Factors by Scenario, 1985-2005[a]			
	Maximum Development		Limited Development	
	Carbon County	Emery County	Carbon County	Emery County
Housing Units				
Single family	2.98	1.46	3.81	1.97
Multifamily	2.99	1.43	3.80	2.00
Mobile homes	2.99	1.45	3.80	1.97
Education				
Students	5.67	3.00	7.10	4.07
Classrooms	5.65	2.80	7.06	4.00
Teachers	5.65	2.80	7.06	4.00
Health Care				
Hospital beds				
General care	3.64	2.00	4.50	2.00
Long-term care	7.50	-[b]	6.75	-[b]
Medical personnel				
Doctors	4.00	-[b]	5.50	-[b]
Dentists	3.33	-[b]	4.50	-[b]
Nurses	3.40	2.00	4.43	2.00
Public health nurses	4.00	-[b]	4.00	-[b]
Mental health care				
Clinical psychologists	-[b]	-[b]	-[b]	-[b]
Mental health workers	2.00	-[b]	-[b]	-[b]
Public Safety				
Law enforcement				
Police officers	3.64	2.00	4.50	2.00
Patrol cars	3.64	2.00	4.50	2.00
Jail floor space	3.59	1.76	4.49	2.32
Juvenile holding cells	3.00	-[b]	2.00	-[b]
Fire Protection				
Fire hydrant flow (gpm)/ duration (hr)				
Emergency Medical Service				
Ambulances	4.00	-[b]	4.00	-[b]
Emergency medical technicians	4.00	-[b]	4.00	-[b]
Utility Service Demands				
Water system				
Connections	3.59	1.76	4.49	2.31
Supply capacity	3.59	1.76	4.49	2.27
Storage capacity	3.58	1.76	4.47	2.27
Treatment capacity	3.59	1.76	4.49	2.27
Sewage system (10^6 gal)	3.59	1.71	4.44	2.50
Solid waste	-	-	-	-
Other Services				
Parks (land area)	3.56	1.75	4.54	2.00
Libraries				
Books	3.59	1.76	4.48	2.32
Floor space	3.59	1.76	4.49	2.32

[a]Computed as the ratio between 1985 and 2005.

[b]Undefined.

Maximum Development Scenario. Housing demand generated in Carbon County through the maximum development scenario would increase by almost three times during the 1985-2005 period. Every CCD within Carbon County would experience some growth in housing demand, while the Price CCD would absorb the greatest amount of the growth (4,668 additional units in 2005). The city of Price is expected to have the largest increase in housing demand in the CCD, rising to a level 3,034 above the baseline in 2005. A large increase (albeit smaller than the Price CCD) is also forecast to occur in the East Carbon CCD, where 619 additional units would be needed by 2005, and the Helper CCD where 564 units would be required.

In Emery County, the housing demand resulting from the other energy projects of the maximum development scenario would be concentrated in the Castle Dale-Huntington CCD. Countywide, there would be an increase in additional housing demand by a factor of about 1.45 over the period. In the Castle Dale-Huntington CCD, a need for 268 additional housing units in 2005 is projected. This growth would be most noticeable in Castle Dale (93 additional units) and Huntington and Orangeville (67 additional units each). The Green River CCD would need 3 additional units in 2005, while in the Emery-Ferron CCD would need 37 additional units in the same year.

Large increases in educational services are projected for both Carbon and Emery counties. In Carbon County, 5.67 times the number of additional students in 1985 are projected for 2005. The growth factor between 1985 and 2005 is three in Emery County. The numbers of classrooms and teachers would increase at a rate to maintain standards.

Health care services would experience increases similar to most other socioeconomic categories. In Carbon County, the cumulative growth factors for these services range from 2.0 to 7.5 times the 1985 level. The greatest increases would occur in the number of hospital beds. Growth factors in Emery County for general care hospital beds and nurses would be 2.0, as relatively small impacts are expected during the period.

Public safety would also realize moderate increases in demand as a result of the maximum development projects. There would be a need for 10,053 additional square feet of jail space in 2005 in Carbon County and for 577 additional square feet in Emery County. And there would be a need for 40 additional police officers and patrol cars in Carbon County, while Emery County would require only two additional police officers and two additional patrol cars. Public safety in Emery County would increase more slowly than Carbon County, with growth factors for police officers and patrol cars projected to be 2.0 in Emery County, while in Carbon County the growth rate would be 3.64.

Utility service demands, including all water system components and the sewage system, would realize a similar rate of increase in both counties. Growth factors for the period in Carbon County would be more than 3.5; in Emery County they would be more than 1.7.

In each county, the increases incurred in the parks and library services would be about equal to the growth in utility demands. Parks would grow to levels 3.56 (in Carbon) and 1.75 (in Emery) times the 1985 levels. Library services would grow by a factor of 3.59 in Carbon and 1.76 in Emery.

Limited Development Scenario. The other energy projects planned under the limited development scenario would create a housing demand in Carbon County 3.8 times greater in 2005 than the additional 1985 demand. Price CCD would again be the fastest growing area, with 4,319 additional housing units projected for 2005. The Helper CCD would have a need for 534 additional housing units in 2005; 450 would be needed in the CCD of East Carbon.

The Castle Dale-Huntington CCD would have the largest increase in Emery County of the three CCDs, with a housing need of 227 units by 2005. Castle Dale, Huntington, and Orangeville would have the greatest housing demand increase in the county. The Emery-Ferron CCD would grow to 36 additional units, and the Green River CCD would increase by 20 units by the year 2005.

The increases projected for the education system would be greater in Carbon County than in Emery: additional students would increase by a factor of 7.10 in Carbon and 4.07 in Emery; the numbers of teachers and classrooms would both grow by 7.06 times in Carbon and by 4.00 times in Emery.

Demands for health care services would grow faster in Carbon County than in Emery County, with growth factors in Carbon as high as 6.75. Growth factors for health care services in Emery County would be at 2.00 for general care hospital beds and nurses.

The public safety demands are also projected to grow faster in Carbon County than in Emery. Police officers and patrol cars would increase by a factor of 4.50 in Carbon County and 2.00 in Emery County. Both counties are expected to need approximately the same amount of jail space as for officers and patrol cars than would be projected for 1985, in each respective county.

Moderate increases are again expected for the utility services. In Carbon County, utility service demands would increase by at least 4.4 times the additional demand projected for 1985. In Emery County, this utility service growth is projected to be around 2.2 to 2.5 times the forecasted 1985 levels.

Park and library services would grow at nearly the same rate as the utility services: a growth factor of 4.5 in Carbon County and 2.0 to 2.3 in Emery County.

Magnitude of Impact on Infrastructure Demands Caused by Other Energy Projects

The following section describes the magnitude of infrastructure impacts by county under each of the two scenarios. The infrastructure impacts caused by these scenarios are presented as a percentage of the county totals projected for each window year. Data are shown in Tables 5.16 to 5.19. The third column of every window year presents the proportion of the total new service demand created by the two scenarios for other energy projects.

Maximum Development Scenario. In Carbon County, the change in infrastructure service demands caused by the projects of the maximum development scenario would constitute about 50% of the county's total new demand (baseline and proposed action scenario projects) in most of the service categories. By 2005, the same infrastructure impacts would make up nearly 60% of the county's total in most service categories. In all the window years, the additional infrastructure demands caused by the proposed action scenario would constitute between 33% and 60% of the county totals in all but a few categories. During the study period, new infrastructure demands are not projected to exceed 60% of the total service requirements.

The impact of the maximum development scenario would have much less effect in Emery County. In 1985, the infrastructure impacts of the scenario would constitute less than 27% of the county's total demand in all service categories, and the percentage would be similar in 1990. Slight increases in infrastructure demand are expected in 1995 under the scenario, when it is forecasted that these impacts will constitute between 20% and 30% of the total in most categories. Again, only slight increases in demand are projected in most categories for 2000 and 2005. A notable exception is education, where in 2005 the new infrastructure demands created by the scenario projects would constitute less than 20% of the total county demands. Also, for six categories (public health nurses, psychologists, mental health workers, juvenile holding cells, ambulances, and emergency medical technicians) there would be no increase in demand due to the other energy projects under this scenario for the entire study period. The new infrastructure demands created by the other energy projects would not exceed one third of the total service requirements in 2005.

Limited Development Scenario. The impacts on the public and private infrastructure from the other energy projects would grow steadily from 1985 to 2000 in Carbon County under this development scenario. In 1985, the infrastructure demands from the limited development scenario would account for less than 40% of the total service demands in the county. In 1990, this proportion would rise to between 40% and 53% of the total in almost every category. By 2005, the infrastructure demands created by the other energy projects of the limited development scenario would constitute at least 55% of

Table 5.16 Summary of the Changes in Carbon County Infrastructure Service Demands Resulting from the Maximum Development Scenario[a]

Service Category in Carbon County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Maximum Development Scenario		Projected Baseline Demand Increment[b]	Maximum Development Scenario		Projected Baseline Demand Increment[b]	Maximum Development Scenario		Projected Baseline Demand Increment[b]	Maximum Development Scenario		Projected Baseline Demand Increment[b]	Maximum Development Scenario	
		Demand[c]	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	1,290	1,177	47.7	2,126	2,603	55.0	2,396	3,351	58.3	2,528	3,629	58.9	2,636	3,510	57.1
Multifamily	323	294	47.6	532	651	55.0	599	838	58.3	632	907	58.9	659	878	57.1
Mobile homes	538	490	47.7	886	1,085	55.0	998	1,396	58.3	1,053	1,512	58.9	1,098	1,463	57.1
Education															
Students	1,924	1,072	35.8	3,824	2,660	41.0	4,824	4,922	50.5	4,624	6,563	58.7	4,724	6,076	56.3
Classrooms	77	43	35.8	153	106	40.9	193	197	50.5	185	263	58.7	189	243	56.3
Teachers	77	43	35.8	153	106	40.9	193	197	50.5	185	263	58.7	189	243	56.3
Health Care															
Hospital beds															
General care	15	11	42.3	25	27	51.9	29	37	56.1	30	42	58.3	31	40	56.3
Long-term care	23	4	14.8	39	24	38.1	39	30	43.5	39	33	45.8	43	30	41.1
Medical personnel															
Doctors	5	3	37.5	8	8	50.0	9	11	55.0	9	13	59.1	10	12	54.5
Dentists	4	3	42.9	7	7	50.0	8	9	52.9	8	10	55.6	8	10	55.6
Nurses	13	10	43.5	21	23	52.3	25	32	56.1	25	36	59.0	26	34	56.7
Public health nurses	2	1	33.3	3	3	50.0	3	4	57.1	3	4	57.1	4	4	50.0
Mental health care															
Clinical psychologists	1	0	0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health workers	1	1	50.0	2	1	33.3	2	2	50.0	2	2	50.0	2	2	50.0
Public Safety															
Law enforcement															
Police officers	15	11	42.3	25	27	51.9	29	37	56.1	30	42	58.3	31	40	56.3
Patrol cars	15	11	42.3	25	27	51.9	29	37	56.1	30	42	58.3	31	40	56.3
Jail space (sq ft)	3,703	2,803	43.1	6,161	6,697	52.1	7,161	9,342	56.6	7,306	10,496	59.0	7,551	10,053	57.1
Juvenile holding cells	1	1	50.0	2	2	50.0	2	2	50.0	2	3	60.0	2	3	60.0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	3,000/ 10	2,500/ 10	45.5	3,000/ 10	3,500/ 10	53.8	3,000/ 10	4,000/ 10	57.1	3,000/ 10	4,500/ 10	60.0	3,000/ 10	4,500/ 10	60.0
Emergency Medical Service															
Ambulances	2	1	33.3	3	3	50.0	3	4	57.1	3	4	57.1	4	4	50.0
Emergency medical technicians	14	7	33.3	21	21	50.0	21	28	57.1	21	28	57.1	28	28	50.0
Utility Service Demands															
Water system															
Connections	2,390	1,808	43.1	3,975	4,321	52.1	4,620	6,027	56.6	4,714	6,772	59.0	4,872	6,486	57.1
Supply (10^6 gal/d)	3.82	2.89	43.1	6.36	6.91	52.1	7.39	9.64	56.6	7.54	10.83	59.0	7.79	10.38	57.1
Storage (10^6 gal/d)	1.78	1.45	44.9	3.18	3.46	52.1	3.70	4.82	56.6	3.77	5.42	59.0	3.90	5.19	57.1
Treatment (10^6 gal/d)	3.82	2.89	43.1	6.36	6.91	52.1	7.39	9.64	56.6	7.54	10.83	59.0	7.79	10.38	57.1
Sewage system (10^6 gal/d)	0.74	0.56	43.1	1.23	1.34	52.1	1.43	1.87	56.7	1.46	2.10	59.0	1.51	2.01	57.1
Solid waste[d]															
Other Services															
Parks (acres)	45	34	43.0	74	80	51.9	86	112	56.6	88	126	58.9	91	121	57.1
Libraries															
Books	14,812	11,210	43.1	24,642	26,786	52.1	28,642	37,366	56.6	29,222	41,982	59.0	30,202	40,210	57.1
Space (sq ft)	3,703	2,803	43.1	6,161	6,697	52.1	7,161	9,342	56.6	7,306	10,496	59.0	7,551	10,053	57.1

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (April 1984). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]Less than one person or unit of service required as a result of the change in projected population.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

Table 5.17 Summary of the Changes in Emery County Infrastructure Service Demands Resulting from the Maximum Development Scenario[a]

Service Category in Emery County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Maximum Development Scenario		Projected Baseline Demand Increment[b]	Maximum Development Scenario		Projected Baseline Demand Increment[b]	Maximum Development Scenario		Projected Baseline Demand Increment[b]	Maximum Development Scenario		Projected Baseline Demand Increment[b]	Maximum Development Scenario	
		Demand[c]	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	382	138	26.5	448	158	26.1	472	196	29.3	448	208	31.7	412	201	32.8
Multifamily	96	35	26.7	112	39	25.8	118	49	29.3	112	52	31.7	103	50	32.7
Mobile homes	159	58	26.7	187	66	26.1	197	82	29.4	187	87	31.8	172	84	32.8
Education															
Students	816	120	12.8	1,416	163	10.3	1,716	291	14.5	1,516	379	20.0	1,516	360	19.2
Classrooms	33	5	13.2	57	7	10.9	69	12	14.8	61	15	19.7	61	14	18.7
Teachers	33	5	13.2	57	7	10.9	69	12	14.8	61	15	19.7	61	14	18.7
Health Care															
Hospital beds															
General care	6	1	14.3	7	2	22.2	8	2	20.0	7	2	22.2	7	2	22.2
Long-term care	6	0	0	6	2	25.0	6	2	25.0	4	2	33.3	4	2	33.3
Medical personnel															
Doctors	2	0	0	3	0	0	3	1	25.0	2	1	33.3	2	1	33.3
Dentists	2	0	0	2	0	0	2	1	33.3	2	1	33.3	2	1	33.3
Nurses	5	1	16.7	6	1	14.3	7	2	22.2	6	2	25.0	6	2	25.0
Public health nurses	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Mental health care															
Clinical psychologists	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Mental health workers	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Public Safety															
Law enforcement															
Police officers	6	1	14.3	7	2	22.2	8	2	20.0	7	2	22.2	7	2	22.2
Patrol cars	6	1	14.3	7	2	22.2	8	2	20.0	7	2	22.2	7	2	22.2
Jail space (sq ft)	1,305	327	20.0	1,695	408	19.4	1,815	548	23.2	1,640	602	26.9	1,550	577	27.1
Juvenile holding cells	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	1,750/ 7	1,000/ 4	36.4	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3
Emergency Medical Service															
Ambulances	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Emergency medical technicians	7	0	0	7	0	0	7	0	0	7	0	0	7	0	0
Utility Service Demands															
Water system															
Connections	842	211	20.0	1,094	263	19.4	1,171	353	23.2	1,058	388	26.8	1,000	372	27.1
Supply (10^6 gal/d)	1.35	0.34	20.1	1.75	0.42	19.4	1.87	0.57	23.4	1.69	0.62	26.8	1.60	0.60	27.3
Storage (10^6 gal/d)	0.67	0.17	20.2	0.87	0.21	19.4	0.94	0.28	23.0	0.85	0.31	26.7	0.80	0.30	27.3
Treatment (10^6 gal/d)	1.35	0.34	20.1	1.75	0.42	19.4	1.87	0.57	23.4	1.69	0.62	26.8	1.60	0.60	27.3
Sewage system (10^6 gal/d)	0.26	0.07	21.2	0.34	0.08	19.0	0.36	0.11	23.4	0.33	0.12	26.7	0.31	0.12	27.9
Solid waste[d]															
Other Services															
Parks (acres)	16	4	20.0	21	5	19.2	22	7	24.1	20	7	25.9	19	7	26.9
Libraries															
Books	5,218	1,308	20.0	6,778	1,630	19.4	7,258	2,190	23.2	6,558	2,406	26.8	6,198	2,308	27.1
Space (sq ft)	1,305	327	20.0	1,695	408	19.4	1,815	548	23.2	1,640	602	26.9	1,550	577	27.1

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (April 1984). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]Less than one person or unit of service required as a result of the change in projected population.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

Table 5.18 Summary of the Changes in Carbon County Infrastructure Service Demands Resulting from the Limited Development Scenario[a]

Service Category in Carbon County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Limited Development Scenario		Projected Baseline Demand Increment[b]	Limited Development Scenario		Projected Baseline Demand Increment[b]	Limited Development Scenario		Projected Baseline Demand Increment[b]	Limited Development Scenario		Projected Baseline Demand Increment[b]	Limited Development Scenario	
		Demand[c]	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	1,290	836	39.3	2,126	2,339	52.4	2,396	3,014	55.7	2,528	3,286	56.5	2,636	3,182	54.7
Multifamily	323	209	39.3	532	585	52.4	599	753	55.7	632	821	56.5	659	795	54.7
Mobile homes	538	349	39.3	886	975	52.4	998	1,256	55.7	1,053	1,369	56.5	1,098	1,326	54.7
Education															
Students	1,924	770	28.6	3,824	2,339	38.0	4,824	4,389	47.6	4,624	5,915	56.1	4,724	5,468	53.6
Classrooms	77	31	28.7	153	94	38.1	193	176	47.7	185	237	56.2	189	219	53.7
Teachers	77	31	28.7	153	94	38.1	193	176	47.7	185	237	56.2	189	219	53.7
Health Care															
Hospital beds															
General care	15	8	34.8	25	24	49.0	29	33	53.2	30	38	55.9	31	36	53.7
Long-term care	23	4	14.8	39	22	36.1	39	27	40.9	39	30	43.5	43	27	38.6
Medical personnel															
Doctors	5	2	28.6	8	7	46.7	9	10	52.6	9	11	55.0	10	11	52.4
Dentists	4	2	33.3	7	6	46.2	8	8	50.0	8	9	52.9	8	9	52.9
Nurses	13	7	35.0	21	20	48.8	25	28	52.8	25	32	56.1	26	31	54.4
Public health nurses	2	1	33.3	3	2	40.0	3	3	50.0	3	4	57.1	4	4	50.0
Mental health care															
Clinical psychologists	1	0	0	1	1	50.0	1	1	50.0	1	1	50.0	1	1	50.0
Mental health workers	1	0	0	2	1	33.3	2	2	50.0	2	2	50.0	2	2	50.0
Public Safety															
Law enforcement															
Police officers	15	8	34.8	25	24	49.0	29	33	53.2	30	38	55.9	31	36	53.7
Patrol cars	15	8	34.8	25	24	49.0	29	33	53.2	30	38	55.9	31	36	53.7
Jail space (sq ft)	3,703	2,028	35.4	6,161	5,983	49.3	7,161	8,364	53.9	7,306	9,473	56.5	7,551	9,096	54.6
Juvenile holding cells	1	1	50.0	2	2	50.0	2	2	50.0	2	2	50.0	2	2	50.0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	3,000/ 10	2,000/ 8	40.0	3,000/ 10	3,000/ 10	50.0	3,000/ 10	4,000/ 10	57.1	3,000/ 10	4,000/ 10	57.1	3,000/ 10	4,000/ 10	57.1
Emergency Medical Service															
Ambulances	2	1	33.3	3	2	40.0	3	3	50.0	3	4	57.1	4	4	50.0
Emergency medical technicians	14	7	33.3	21	14	40.0	21	21	50.0	21	28	57.1	28	28	50.0
Utility Service Demands															
Water system															
Connections	2,390	1,308	35.4	3,975	3,860	49.3	4,620	5,396	53.9	4,714	6,112	56.5	4,872	5,868	54.6
Supply (10^6 gal/d)	3.82	2.09	35.4	6.36	6.18	49.3	7.39	8.63	53.9	7.54	9.78	56.5	7.79	9.39	54.7
Storage (10^6 gal/d)	1.78	1.05	37.1	3.18	3.09	49.3	3.70	4.32	53.9	3.77	4.89	56.5	3.90	4.69	54.6
Treatment (10^6 gal/d)	3.82	2.09	35.4	6.36	6.18	49.3	7.39	8.63	53.9	7.54	9.78	56.5	7.79	9.39	54.7
Sewage system (10^6 gal/d)	0.74	0.41	35.7	1.23	1.20	49.4	1.43	1.67	53.9	1.46	1.89	56.4	1.51	1.82	54.7
Solid waste[d]															
Other Services															
Parks (acres)	45	24	34.8	74	72	49.3	86	100	53.8	88	114	56.4	91	109	54.5
Libraries															
Books	14,812	8,112	35.4	24,642	23,932	49.3	28,642	33,456	53.9	29,222	37,892	56.5	30,202	36,382	54.6
Space (sq ft)	3,703	2,028	35.4	6,161	5,983	49.3	7,161	8,364	53.9	7,306	9,473	56.5	7,551	9,096	54.6

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (April 1984). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]Less than one person or unit of service required as a result of the change in projected population.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

Table 5.19 Summary of the Changes in Emery County Infrastructure Service Demands Resulting from the Limited Development Scenario[a]

Service Category in Emery County	1985			1990			1995			2000			2005		
	Projected Baseline Demand Increment[b]	Limited Development Scenario		Projected Baseline Demand Increment[b]	Limited Development Scenario		Projected Baseline Demand Increment[b]	Limited Development Scenario		Projected Baseline Demand Increment[b]	Limited Development Scenario		Projected Baseline Demand Increment[b]	Limited Development Scenario	
		Demand[c]	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total		Demand	% of Total
Housing															
Single family	382	86	18.4	448	131	22.6	472	163	25.7	448	175	28.1	412	169	29.1
Multifamily	96	21	17.9	112	33	22.8	118	41	25.8	112	44	28.2	103	42	29.0
Mobile homes	159	36	18.5	187	55	22.7	197	68	25.7	187	73	28.1	172	71	29.2
Education															
Students	816	74	8.3	1,416	131	8.5	1,716	239	12.2	1,516	317	17.3	1,516	301	16.6
Classrooms	33	3	8.3	57	5	8.1	69	10	12.7	61	13	17.6	61	12	16.4
Teachers	33	3	8.3	57	5	8.1	69	10	12.7	61	13	17.6	61	12	16.4
Health Care															
Hospital beds															
General care	6	1	14.3	7	1	12.5	8	2	20.0	7	2	22.2	7	2	22.2
Long-term care	6	0	0	6	1	14.3	6	2	25.0	4	2	33.3	4	1	20.0
Medical personnel															
Doctors	2	0	0	3	0	0	3	1	25.0	2	1	33.3	2	1	33.3
Dentists	2	0	0	2	0	0	2	0	0	2	1	33.3	2	1	33.3
Nurses	5	1	16.7	6	1	14.3	7	2	22.2	6	2	25.0	6	2	25.0
Public health nurses	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Mental health care															
Clinical psychologists	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Mental health workers	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Public Safety															
Law enforcement															
Police officers	6	1	14.3	7	1	12.5	8	2	20.0	7	2	22.2	7	2	22.2
Patrol cars	6	1	14.3	7	1	12.5	8	2	20.0	7	2	22.2	7	2	22.2
Jail space (sq ft)	1,305	209	13.8	1,695	336	16.5	1,815	453	20.0	1,640	503	23.5	1,550	484	23.8
Juvenile holding cells	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Fire Protection															
Fire hydrant flow (gpm)/ duration (hr)	1,750/ 7	1,000/ 4	36.4	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3	2,000/ 8	1,000/ 4	33.3
Emergency Medical Service															
Ambulances	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Emergency medical technicians	7	0	0	7	0	0	7	0	0	7	0	0	7	0	0
Utility Service Demands															
Water system															
Connections	842	135	13.8	1,094	218	16.6	1,171	292	20.0	1,058	325	23.5	1,000	312	23.8
Supply (10^6 gal/d)	1.35	0.22	14.0	1.75	0.35	16.7	1.87	0.47	20.1	1.69	0.52	23.5	1.60	0.50	23.8
Storage (10^6 gal/d)	0.67	0.11	14.1	0.87	0.17	16.3	0.94	0.23	19.7	0.85	0.26	23.4	0.80	0.25	23.8
Treatment (10^6 gal/d)	1.35	0.22	14.0	1.75	0.35	16.7	1.87	0.47	20.1	1.69	0.52	23.5	1.60	0.50	23.8
Sewage system (10^6 gal/d)	0.26	0.04	13.3	0.34	0.07	17.1	0.36	0.09	20.0	0.33	0.10	23.3	0.31	0.10	24.4
Solid waste[d]															
Other Services															
Parks (acres)	16	3	15.8	21	4	16.0	22	5	18.5	20	6	23.1	19	6	24.0
Libraries															
Books	5,218	834	13.8	6,778	1,344	16.5	7,258	1,812	20.0	6,558	2,012	23.5	6,198	1,936	23.8
Space (sq ft)	1,305	209	13.8	1,695	336	16.5	1,815	453	20.0	1,640	503	23.5	1,550	484	23.8

[a]Developed from guidelines prepared by the Department of Community and Economic Development, State of Utah and adapted from UPED model output, Office of the State Planning Coordinator (April 1984). See Appendix A for service standard guidelines.

[b]Numbers represent service demands required to satisfy the post-1980 baseline population growth regardless of 1980 operating conditions.

[c]Less than one person or unit of service required as a result of the change in projected population.

[d]The State of Utah community facility guidelines do not include a solid-waste standard. Therefore, an estimate of solid waste disposal impacts could not be determined.

the county's total demands in every service category (a slight decrease from 2000). The proportion of infrastructure impacts in Carbon County attributable to the limited development scenario is between 50% and 55% in almost every category in 2005.

Under this scenario, the infrastructure impacts of the other energy projects in Emery County are expected to increase steadily throughout the entire period of 1985 to 2005. Relatively small impacts are expected in 1985, but by 2005 the infrastructure impacts are forecast to grow to between 20% and 33% of the county's total new infrastructure demands in that window year. The only categories that would not reach this impact proportion are education, where the limited development scenario impacts on the county infrastructure are projected to constitute about 16.5% of the total; and the same six Emery County categories noted above (in the maximum development scenario) are not affected by other energy projects during all 20 years. The scenario-induced infrastructure impacts in every other category represent at most one-third of the Emery County's total demands throughout the 1985-2005 period.

6 SUMMARY AND COMPARISON OF CUMULATIVE IMPACTS

This section describes the cumulative impacts of the proposed action, partial conversion, and unitized development scenarios relative to the baseline projections. The effects of the other energy projects (maximum and limited development scenarios) are included in the cumulative impacts, to account for the simultaneous population and employment requirements that would arise.

The baseline projections of the population and employment are the actual levels that would be attained in the five window years. Alternately, the employment and population figures for the high, medium, and low cumulative development scenarios and the other energy projects are presented as a change from the baseline conditions.

6.1 TOTAL POPULATION IMPACTS BY COUNTY AND GROWTH STIMULI

The total population impacts projected to result under the various growth stimuli -- proposed action, partial conversion, and unitized development scenarios; other energy projects; and the projected baseline -- are shown in Tables 6.1-6.3. Table 6.1 presents the actual population impacts; population by growth stimuli is presented as a change from baseline. These figures represent the increment over the baseline directly attributable to the proposed developments. Table 6.2 presents the proportional effects of the high, medium, and low cumulative totals. Table 6.3 presents the average annual growth rates for each of the three scenarios by county and time period.

Figure 6.1 presents the total population that would result in the area under each of the three cumulative development scenarios. This figure indicates not only the total population level projected for the two-county area but also the components that constitute the total: baseline, other energy projects, and tar sands scenario. Generally, the proposed action scenario would cause the largest increase in population, followed by the two other energy project scenarios.

Carbon County is projected to account for more than 70% of the total population in the two-county area. Population growth would also be concentrated in Carbon County, as it is forecast to increase by a factor of more than six by the year 2005 under each of the three cumulative scenarios. A county-level analysis follows.

6.1.1 Carbon County

The impacts on the population base in Carbon County due to the tar sands projects are projected to be much larger than the same impacts in Emery County. The high cumulative scenario (composed of the proposed action

Table 6.1 Total Population Impact by County and Growth Stimuli (1985-2005)

County and Window Year	Baseline (1)	Tar Sands Scenarios			Other Energy Project Scenarios		Cumulative Scenario Totals		
		Proposed Action Development (2)	Partial Conversion Development (3)	Unitized Development (4)	Maximum Development (5)	Limited Development (6)	High (2+5)	Medium (3+5)	Low (4+6)
Carbon									
1985	29,590	73	59	25	5,605	4,056	5,678	5,664	4,081
1990	34,500	11,197	3,470	44	13,393	11,966	24,590	16,863	12,010
1995	36,500	14,883	8,522	3,709	18,683	16,728	33,566	27,205	20,437
2000	36,790	18,166	13,302	7,962	20,991	18,946	39,157	34,293	26,908
2005	37,280	21,536	16,294	11,071	20,105	18,191	41,641	36,399	29,262
Emery									
1985	14,060	12	10	4	654	417	666	664	421
1990	14,840	1,543	476	4	815	672	2,358	1,291	676
1995	15,080	1,692	875	440	1,095	906	2,787	1,970	1,346
2000	14,730	1,818	1,323	829	1,203	1,006	3,021	2,526	1,835
2005	14,550	2,076	1,553	1,068	1,154	968	3,230	2,707	2,036

Table 6.2 Proportion of Total Population Existing in Window Years Attributable to the Cumulative Scenario Totals

County/ Window Year	Baseline + High Cumulative Total	High Cumulative as % of Total	Baseline + Medium Cumulative Total	Medium Cumulative as % of Total	Baseline + Low Cumulative Total	Low Cumulative as % of Total
Carbon						
1985	35,268	16.1	35,254	16.1	33,671	12.1
1990	59,090	41.6	51,363	32.8	46,510	25.8
1995	70,066	47.9	63,705	42.7	56,937	35.9
2000	75,947	51.6	71,083	48.2	63,698	42.2
2005	78,921	52.8	73,679	49.4	66,542	44.0
Emery						
1985	14,726	4.5	14,724	4.5	14,481	2.9
1990	17,198	13.7	16,131	8.0	15,516	4.4
1995	17,867	15.6	17,050	11.6	16,426	8.2
2000	17,751	17.0	17,256	14.6	16,565	11.1
2005	17,780	18.2	17,257	15.7	16,586	12.3

development scenario for tar sands projects plus the maximum development scenario for other energy projects) would account for 52.8% of the total population (baseline plus high cumulative scenario) projected for Carbon County in 2005. Population impacts would range from 5,678 to 41,641 under the high cumulative scenario. The fastest growth would occur between 1985 and 1990, when additional population due to the high cumulative scenario would increase at a rate of 34.06% per year. In 2005, an additional 41,641 people are expected to live in Carbon County as a result of the high cumulative scenario. Total population of the county would grow more under this scenario than under either of the other two scenarios.

The medium cumulative scenario (partial conversion development scenario for tar sands projects plus maximum development scenario for other energy projects) would have slightly less effect on the total population in Carbon County. It is projected that the medium cumulative scenario would generate 49.4% of the total population (baseline plus medium cumulative scenario) in the county in 2005. The growth in population projected to occur under the medium cumulative scenario is 36,399 by the year 2005. The most rapid growth in this impact would also occur between 1985 and 1990, when the population due to the medium cumulative scenario would increase by 24.38% annually.

The population impacts in Carbon County due to the low cumulative scenario (unitized development scenario for tar sands projects plus limited development scenario for other energy projects) are projected to be less than either of the other two scenarios discussed above. In 2005, there are

Table 6.3 Average Annual Population Growth Rates by Development Scenario in Each County

	Average Annual Compound Percent Change by Scenario and Year				
County/Scenario	1985	1990	1995	2000	2005
Carbon					
High Cumulative	-	34.06	6.42	3.13	1.24
Medium Cumulative	-	24.38	10.04	4.74	1.20
Low Cumulative	-	24.10	11.22	5.66	1.69
Emery					
High Cumulative	-	28.77	3.40	1.63	1.35
Medium Cumulative	-	14.22	8.82	5.10	1.39
Low Cumulative	-	9.93	14.77	6.39	2.10

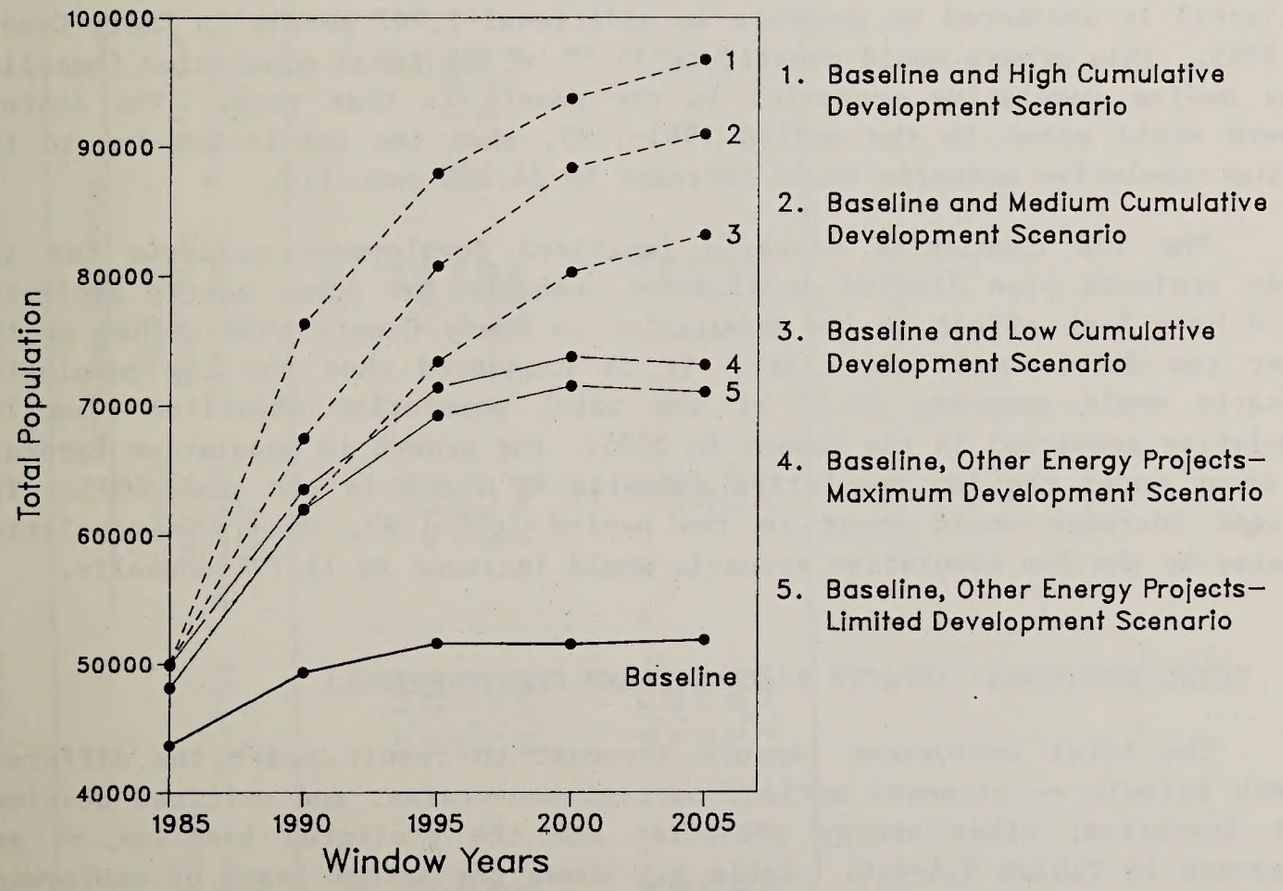


Fig. 6.1 Total Areawide Population by Growth Stimuli

projected to be 29,262 additional people as a result of development under the low cumulative scenario. This additional population would make up 44.0% of the total population (baseline plus low cumulative scenario) in Carbon County in 2005. The fastest growth in population due to the low cumulative scenario would again occur between 1985 and 1990, when this additional population would increase by an average of 24.10% each year.

6.1.2 Emery County

Growth trends in Emery County are expected to be similar to those forecast for Carbon County, but on a much smaller scale. The high cumulative scenario (proposed action development scenario for tar sands projects plus maximum development scenario for other energy projects) is projected to generate 18.2% of the total population growth (baseline plus high cumulative scenario) forecast for Emery County in 2005. The most rapid growth is expected to occur between 1985 and 1990, when population due to the high cumulative scenario would increase by 28.77% each year. There are projected to be an additional 3,230 people in Emery County in 2005 as a result of development under the high cumulative scenario.

The medium cumulative scenario (partial conversion development scenario for tar sands projects plus maximum development scenario for other energy projects) is projected to generate an additional 2,707 people in Emery County in 2005. This growth would constitute 15.7% of the total population (baseline plus medium cumulative scenario) in the county in that year. The fastest growth would occur in the period 1985-1990, when the population due to the medium cumulative scenario would increase by 14.22% annually.

The low cumulative scenario (unitized development scenario for tar sands projects plus limited development scenario for other energy projects) would have less effect on the population in Emery County than either of the other two development scenarios. It is projected that the low cumulative scenario would generate 12.3% of the total population (baseline plus low cumulative scenario) in the county in 2005. The growth in population forecast to occur under the low cumulative scenario is 2,036 in the year 2005. The fastest increase would occur in the period 1990-1995, when the population created by the low cumulative scenario would increase by 14.77% annually.

6.2 TOTAL EMPLOYMENT IMPACTS BY COUNTY AND GROWTH STIMULI

The total employment impacts forecast to result under the different growth stimuli -- proposed action, partial conversion, and unitized development scenarios; other energy projects; and the projected baseline -- are presented in Tables 6.4-6.6. Table 6.4 shows the actual level of employment impact, presented as a change from baseline for each growth stimuli. Table 6.5 presents the proportional impact of the high, medium, and low cumulative

Table 6.4 Total Employment Impacts by County and Growth Stimuli (1985-2005)

County and Window Year	Baseline (1)	Tar Sands Scenarios: Proposed Action Development (2)	Tar Sands Scenarios: Partial Conversion Development (3)	Tar Sands Scenarios: Unitized Development (4)	Other Energy Project Scenarios: Maximum Development (5)	Other Energy Project Scenarios: Limited Development (6)	Cumulative Scenario Totals: High (2+5)	Cumulative Scenario Totals: Medium (3+5)	Cumulative Scenario Totals: Low (4+6)
Carbon									
1985	12,240	41	34	14	2,977	2,119	3,018	3,011	2,133
1990	14,050	6,125	1,898	23	6,099	5,366	12,224	7,997	5,389
1995	15,000	7,351	4,104	1,904	7,512	6,671	14,863	11,616	8,575
2000	15,510	8,171	5,983	3,655	8,288	7,413	16,459	14,271	11,068
2005	16,020	9,346	7,093	4,752	8,100	7,255	17,446	15,193	12,007
Emery									
1985	6,730	0	0	0	332	296	332	332	296
1990	6,650	238	73	0	757	736	995	830	736
1995	6,770	272	143	71	822	789	1,094	965	860
2000	6,800	311	225	143	852	818	1,163	1,077	961
2005	6,880	363	270	182	842	810	1,205	1,112	992

Table 6.5 Proportion of Total Employment Existing in Window Years Attributable to the Cumulative Scenario Totals

County/ Window Year	Baseline + High Cumulative Total	High Cumulative as % of Total	Baseline + Medium Cumulative Total	Medium Cumulative as % of Total	Baseline + Low Cumulative Total	Low Cumulative as % of Total
Carbon						
1985	15,258	19.8	15,251	19.7	14,373	14.8
1990	26,274	46.5	22,047	36.3	19,439	27.7
1995	29,863	49.8	26,616	43.6	23,575	36.4
2000	31,969	51.5	29,781	47.9	26,578	41.6
2005	33,466	52.1	31,213	48.7	28,027	42.8
Emery						
1985	7,062	4.7	7,062	4.7	7,026	4.2
1990	7,645	13.0	7,480	11.1	7,386	10.0
1995	7,864	13.9	7,735	12.5	7,630	11.3
2000	7,963	14.6	7,877	13.7	7,761	12.4
2005	8,085	14.9	7,992	13.9	7,872	12.6

totals. Table 6.6 shows the average annual growth rate during this time period by scenario and county.

Figure 6.2 illustrates the total employment that would result in the area as a result of each of the three cumulative development scenarios. This figure indicates not only the total employment level projected for the two-county area but also the components that constitute the total: baseline, other energy projects, and tar sands scenario. Generally, the proposed action scenario would cause the largest increase in employment, followed by the two other energy project scenarios.

Carbon County would experience the most employment growth, accounting for almost 70% of the total employment in the area in 2005. A county-level analysis follows.

6.2.1 Carbon County

In each of the three scenarios, projected employment impacts would be similar to the projected population impacts. The high cumulative scenario would be responsible for 52.1% of the total employment (baseline plus high cumulative scenario) in the county in 2005. Total employment growth under this scenario would be 17,446 in 2005. The fastest increases would occur from 1985 to 1990, when employment due to the high cumulative scenario would grow by 32.28% annually.

Table 6.6 Average Annual Employment Growth Rates by Development Scenario in Each County

	Average Annual Compound Percent Change by Scenario and Year				
County/Scenario	1985	1990	1995	2000	2005
Carbon					
High Cumulative	-	32.28	3.99	2.06	1.17
Medium Cumulative	-	21.57	7.75	4.20	1.26
Low Cumulative	-	20.37	9.74	5.24	1.64
Emery					
High Cumulative	-	24.55	1.92	1.23	0.71
Medium Cumulative	-	20.11	3.06	2.22	0.64
Low Cumulative	-	19.98	3.16	2.25	0.64

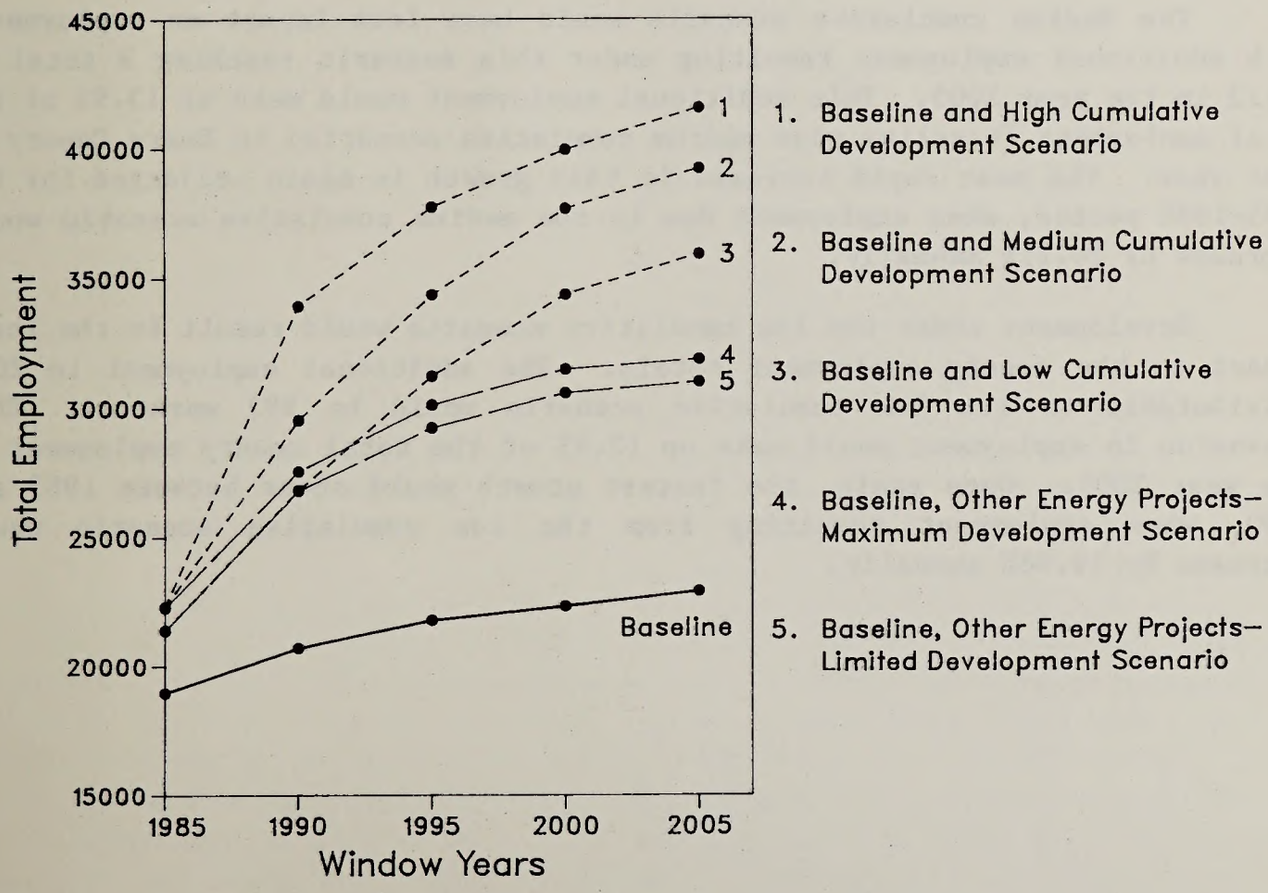


Fig. 6.2 Total Areawide Employment by Growth Stimuli

The medium cumulative scenario would create a growth in employment of 15,193 in the year 2005. This additional employment would constitute 48.7% of the total employment (baseline and medium cumulative scenario) in the county. Employment due to the medium cumulative scenario would also grow fastest from 1985 to 1990, when yearly increases in additional employment would average 21.57%.

The low cumulative scenario would create the least additional employment of the three development scenarios. Employment resulting from the low cumulative scenario would be 12,007 workers in 2005. This figure would represent 42.8% of the total employment (baseline plus low cumulative scenario) in the county in 2005.

6.2.2 Emery County

Development under the high cumulative scenario is projected to result in 1,205 additional jobs in Emery County in 2005. This additional employment would constitute 14.9% of the total employment projected for the county in 2005. The fastest growth in this impact would occur in the period 1985-1990, when employment resulting from the high cumulative scenario would increase by 24.55% per year.

The medium cumulative scenario would have less impact on employment, with additional employment resulting under this scenario reaching a total of 1,112 in the year 2005. This additional employment would make up 13.9% of the total employment (baseline plus medium cumulative scenario) in Emery County in that year. The most rapid increase in this growth is again projected for the 1985-1990 period, when employment due to the medium cumulative scenario would increase by 20.11% annually.

Development under the low cumulative scenario would result in the least impact on the county employment totals. The additional employment in 2005 attributable to the low cumulative scenario would be 992 workers. This expansion in employment would make up 12.6% of the total county employment in the year 2005. Once again, the fastest growth would occur between 1985 and 1990, when employment resulting from the low cumulative scenario would increase by 19.98% annually.

APPENDIX A

ANALYTICAL METHODS, ASSUMPTIONS, AND MODELS USED IN THE ANALYSIS

APPENDIX A

ANALYTICAL METHODS, ASSUMPTIONS, AND MODELS USED IN THE ANALYSIS

This appendix identifies the assumptions and analytical methods used in this report, and includes a discussion of the Utah Process Economic and Demographic (UPED) impact simulation model, and the Spatial Allocation Model (SAM). The summary descriptions of the UPED and the SAM are extracted from the Uintah Basin Synfuels Development report, per the instructions of the authors.

A.1 STUDY CONDITIONS, ASSUMPTIONS, AND METHODS

A.1.1 Baseline Projections

Population and Employment

The baseline projections contained in this report reflect the future based on the existing economic structure of the areas and the changing demographic characteristics of the population. The baseline is not a prediction of the future but rather an attempt to depict the direction current trends are likely to take in the area without tar sands development. Alternative projections that assume tar sands development are then compared to the baseline projection to determine the impact that tar sands development will have on the area.

Characteristic of the baseline projections are declining rates of growth over time. It is assumed that, with a given economic structure, an area will begin to stabilize over the years as its economy matures; under these conditions, accelerated growth would require increases in the basic employment sectors, which would change the area's economic structure. The Utah Process Economic and Demographic impact projection model and the Spatial Allocation Model were applied in making the baseline projections.

Obviously, a recession of the magnitude we have experienced will have an impact on baseline projections for Utah. These projections were produced before the severity of the 1981-82 national recession and its full impact on the state of Utah became apparent. These projections assume that (1) the national recession would have ended in 1982, (2) that recovery would occur during 1983, and (3) that 1983 would be a growth year. The projections also assume that the recession will have no permanently deleterious structural effect on the state's energy and minerals industries or on the economy in general. The validity of this last assumption cannot be determined until a national recovery is well under way.

The baseline projections have been allocated to the census county divisions (CCDs) with the Spatial Allocation Model (SAM).* In allocating the areawide baseline projections among the constituent CCDs, a number of crucial assumptions were made. The most important of these is that the proportional distribution among these CCDs of each sector's basic employment would retain the pattern currently observed. Also assumed was the continuation of current inter-CCD trade patterns. The Price CCD is assumed to continue serving as the highest-order market centers for most industrial sectors, with the other CCDs purchasing substantial amounts of goods and services from these areas.

The community-level baseline projections were developed (in the overall project) with the cooperation of representatives of the local governments. The Southeast Utah Association of Governments, the Uintah Basin Association of Governments, and the Carbon and Uintah County Planning offices were participants. The basic assumption is that the proportion of the population that was historically located in incorporated communities would continue. Exceptions were made where there are constraints to growth based on current capacities and existing plans for expansion of services and facilities.

The baseline projections have incorporated assumptions regarding coal production, oil and gas development, uranium development, manufacturing, power plant construction, and commuting patterns, all of which are important in understanding the baseline projections. The following discussion describes these assumptions for Carbon and Emery counties.

In Carbon and Emery counties the baseline projections assumed coal production to increase from 12.6 million tons in 1980 and move toward the target of 21.6 million tons per year by 1990. During 1982, coal production exceeded 17 million tons per year. However, recent layoffs in this industry would reduce production in 1983, and it would appear that the short-term projections (1983) have been overstated. It is still too early to tell whether or not the longer-term projections for the coal industry have been overstated. The demand for coal would be created primarily by the development of the first two units of the Intermountain Power Project and units 3 and 4 of the Hunter Power Plant complex. After 1990, coal production is assumed to remain stable.** Production is allocated among the census county divisions in accordance with expectations of industry and local planners. Coal mining in the Green River CCD is assumed to be phased out by 1983 in the baseline projection.

The Utah Power and Light's power plant construction plans include units 3 and 4 of the Hunter Power Plant. Unit 3 is assumed to be completed on

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*See Section A.2 for a description of SAM.

**Information from *Utah Energy Facility Siting Study -- Chapter 8 -- Utah Coal Resources*, Utah Consortium for Energy Research and Education, 1981, was used extensively in developing coal demand forecasts.

schedule in 1983. The Hunter Unit 4 is assumed to be delayed three years from its original schedule; construction would begin in 1985, with completion scheduled in 1987. Other sectors that drive growth in the local economy are assumed to follow historical paths throughout the projection period.

Personal Income and Wages

The analysis of income and wages was carried out at the county level, and the data are provided in 1980 dollars.

The average monthly rates for the two counties from 1975 to 1980 for each major nonagricultural employment sector are provided in the report. Mining; construction; and transportation, communication, and utilities have historically had the highest average wage levels. Under the proposed developments, increased employment would be concentrated in the mining and construction sectors.

The relationship between the state's per capita income and the per capita income of the counties were utilized in projecting baseline county personal income figures.* The relationship of county per capita income to the average state per capita income is provided in the report. The baseline income projections for the state assumed an annual growth rate of 1.7%; by the year 2000 the state per capita income would be $11,568.

Carbon County achieved high average per capita income levels relative to the state in the last half of the 1970s. It is assumed that this phenomenon would be reversed during the next two decades and that, by the year 2000, Carbon County per capita personal income would equal that of the state. Per capita personal income in Emery County is presumed to stabilize at 100% of the state figures for the entire projection period.

A.1.2 Impact Projections

Areawide Impacts

In this project, the modeling of economic and demographic impacts through using the UPED model was accomplished by splitting the area of analysis into two regions. The Uintah Basin region -- Duchesne, Uintah, and Daggett counties in Utah and the county census divisions of Rangely and Dinosaur in Rio Blanco and Moffatt in Northeast Colorado -- make up the first region. The second region, the Southeast Utah region, includes Carbon, Emery, Grand, and San Juan counties and the Hanksville CCD in Wayne County and the

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*The approach for projection of county personal income was developed by the Bureau of Economic and Business Research, University of Utah, Salt Lake City, Utah.

Escalante CCD in Garfield County. These two regions interact economically to only a limited extent and are considered separate economic regions. In this project, they were treated separately for modeling purposes; in this report only the Southeast Utah region is considered, and specifically only Carbon and Emery counties.

CCD-Level Impacts

The Spatial Allocation Model (SAM) was used to allocate the multicounty division (MCD) impact projections produced by the UPED model among affected community groups (census county divisions, or CCDs). The SAM allocations are based on commuting patterns of the tar sands operations and construction work forces, historical industrial sector-specific trading patterns, and assumed changes in these trading patterns. Such trading patterns changes would be expected to result from growth in currently lower-order, low-self-sufficiency CCDs, which would be heavily impacted by the tar sands developments.

The trading-pattern assumptions are incorporated into a set of SAM calibration parameters, called SPINTs. Estimation of the SPINT parameters constitutes the primary analytical task in the SAM calibration. In the Southeast Area, the trading-pattern assumptions used in the tar sands impact analysis were based largely on those developed for the current baseline calibration.

As part of the baseline calibration, continuation of current inter-CCD trading patterns was assumed. The bulk of the Southeast Utah trading-pattern assumptions are derived from the baseline calibration. Thus, the Price CCD remains throughout the projection period as the highest-order center in the MCD.

Two CCDs, those of East Carbon and Green River, are projected to undergo substantial trade-pattern changes in response to the proposed tar sands developments. The East Carbon and Green River CCDs are assumed to become much more self-sufficient than they are in the baseline projection. This reflects the major influx of high basic employment. These CCDs are, however, assumed to become less self-sufficient than the Thompson, Hanksville, and Escalante CCDs due to the continued close proximity of the larger Price and Moab CCD trading centers -- which are assumed to continue to serve part of the requirements of East Carbon and Green River.

Commuting Assumptions

A two-step procedure was used to develop commuting-pattern assumptions for the workers directly involved in the construction and operations phases of the tar sands projects. First, a simple gravity model was applied based on existing community size and estimated road distance from the Sunnyside STSA. Exponents of 1.019 and 2.0 were applied to the distance estimates for the construction and operations work forces, respectively. Second, the results of

the gravity model were reviewed by local planners and modified, where appropriate, to reflect the local conditions and opinions. The commuting patterns adopted for each of the STSAs are presented in Table A.1.

Community-Level Projections

Allocation of the SAM CCD-level projections were accomplished by using assumptions developed by local planners. The Southeast Utah Association of Governments, and the Carbon and Uintah County Planning offices were participants. Assumptions were made based on (1) existing capacities for residential and commercial development and constraints to growth, and (2) existing plans for expansion of services and facilities.

Work-Force Assumptions

The manpower profiles used to drive the economic and demographic impact analysis were provided by the BLM. As mentioned earlier, construction work-force estimates were used separately in UPED from those of the operations work force; this is based on the assumption that construction workers living in communities exert less demand on public and private goods and services than do permanent operations workers. There are two reasons for this effect: first, the temporary nature of construction; and second, construction workers have a higher propensity to be single, unaccompanied by their families, or to have smaller families. The construction workers for the tar sands projects are assumed to behave similarly to major project construction workers, in terms of both household size (dependency ratio) and geographic dispersion of residences. Information on construction-worker characteristics was taken from *Construction Worker Profile*, developed by Mountain West Research.

Table A.1 Commuting Patterns of Tar Sands Development
Direct Employees -- Southern Tar Sands Area

	Proportion of Employees Living in CCD					
STSA	Helper	Price	East Carbon	Castle Dale-Huntington	Emery-Ferron	Green River
Sunnyside						
Construction	0.10	0.49	0.26	0.10	-	0.05
Operation	0.07	0.50	0.33	0.08	-	0.02

It should be noted that different work force estimates for the AMOCO project in the Sunnyside STSA were used in the regional analysis as opposed to the site-specific analysis for Sunnyside. The BLM received changes to this project after the regional analysis had been completed. This difference in work force numbers was addressed in the letter April 20, 1983, from BLM to Mr. Hugh Garbowski of Standard Oil Company.

Personal Income Impacts

The impact on personal income resulting from the development of tar sands leases is based on changes in the population of the impact area; changes in the number and industrial mix of jobs in the area; changes in per capita property incomes, transfer payments, and personal contributions to social insurance; and changes in wage rates in each industrial sector. The relevant population and industry-specific employment figures are the employment and population impact projections presented for each alternative.

Average monthly wages for each industrial sector are projected by selecting a representative 1980 wage payments for that sector in the impact area. This figure is projected to increase at the average annual rate of growth of per capita personal income assumed for the State of Utah (1.724% per year) in the baseline personal income projection described previously. Projected average monthly wages and personal income are presented in 1980 dollars through the study.

The average monthly wage for each of the industrial sectors is based on the Carbon County experience. The assumption was based on the similarities of the development of mined mineral resources as a major economic sector in relatively isolated rural areas. Incomes accruing to individual persons rather than persons as economic producers, are typically categorized as property incomes (interest, rents, dividends) plus transfer payments (unemployment compensation, welfare) minus individual contributions to social insurance. These components were aggregated into a single category. Per capita income in this category within the State of Utah is assumed to be the same percentage of its national counterpart as is per capita personal income as a whole (83%). The resultant per capita figure is then increased at the same average annual rate as are the various wage rates to produce annual projections of per capita property income plus transfer payments minus personal social insurance contributions.

Under the tar sands developments scenarios, the relatively higher per capita income would be anticipated with the projected increases in mining (associated with proposed leasing) because of the higher wages paid in the mining and construction sectors.

A.2 MODELS

A.2.1 Utah Process Economic and Demographic Model

The Utah Process Economic and Demographic (UPED) impact simulation model is the official model used by the Utah State Office of the Planning Coordinator to project population and employment growth in the state.* The UPED model is a hybrid of two standard population and economic projection methodologies: (1) the cohort survival model and (2) the economic base model.

In the three-component cohort survival population model, future population levels are projected from base-year figures by adding births, subtracting deaths, and adding net in-migration or subtracting net out-migration. The values of each of the three components of population change (births, deaths, and migration) are projected as functions of the initial-year values, and the resultant increments are added or subtracted to generate the first projection year's values. The process is then repeated to generate the second projection year's values, and so on to the last projection year. The population is disaggregated into appropriate subgroups, called cohorts, whose values are projected over time. In UPED, sex and single year of age cohorts are used. Through the projection years, of course, each cohort ages, and its behavior with respect to demand for goods and services, labor force participation, fertility, mortality, and geographic mobility varies with the aging process.

According to the economic base concept, for all but the largest areas (i.e., national-continental regions), the primary determinant of the level of economic activity, and consequently of population size, is the amount of goods and services produced for export to other areas. Increases or decreases in basic (export) employment produce corresponding changes in the number of households deriving their income from these sectors. These changes, in turn, produce changes in the demand for goods and services produced locally for the local consumption. (These local production/local consumption activities are referred to variously as nonbasic, service, residentiary, or population-dependent sectors.) Initial changes in population-dependent sectors, in turn, produce changes in population and in household incomes, which generate further changes until, finally, a given projected initial change in basic sector employment will produce a "multiplier" change in population-dependent and local employment as well as in population.

In UPED, the economic base methodology is adapted to affect population projection through the migration component. Population projections, in turn,

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*Weaver, Rodger, et al., *UPED 79 - Report on the Revisions of the Utah Process Economic and Demographic Impact Model (UPED)*, Bureau of Economic and Business Research, College of Business, University of Utah; and the Utah Office of the State Planning Coordinator, Salt Lake City, 1980.

generate residentiary employment for each level of basic employment. Thus, the cohort survival and economic base methodologies are combined in UPED to form a complex systems model. The workings of the UPED model and of its key data requirements are presented in Fig. A.1. The top three boxes represent the natural increase (births and deaths), again, and the nonemployment-related part of the migration components of UPED's population-projection methodology.

The initial (year T) population, consisting of a census-type count or estimate of all people residing in the area by age and sex, is adjusted to reflect the temporary absence of some individuals who are permanent residents (an increase) and/or the temporary presence of individuals who are not permanent residents (a decrease). Relevant categories include college students, military people, and others temporarily absent or present. The resulting estimate of the permanent-resident population is then "survived" by applying cohort-specific survival rates. The result is the subset of the initial resident population expected to still be alive the following year. Members of each cohort have aged one year. The aged-survived population is adjusted to reflect projected levels of temporary absence or presence and permanent nonemployment-related migrations in or out of an area. Total births are projected by applying a vector of age-specific birth rates to the female component of this adjusted aged-survived population. The sex of infants and infant mortality are also projected at this stage. The result of these calculations, as shown in Box 3, is the adjusted natural increase in population at year T+1, which becomes the initial estimate of population in that year (Box 4).

The first approximation population projection is the source of two elements of labor market analysis: (1) the initial (pre-employment related migration) labor force and (2) initial population-dependent job opportunities at year T+1 (Boxes 5 and 6, respectively). The labor force is derived by applying projected age- and sex-specific labor force participation rates to the projected population. The projected participation rates depend on both extrapolations of their sectoral trends and year-to-year changes in area economic opportunity.

Population-dependent job opportunities are projected as dependent on (1) the size and age composition of the population, (2) projected sector-specific ratios of the area's per capita residentiary employment to national employment per capita, and (3) projections of national residentiary employment by sector and/or national population by cohort. Thus, changes in the size and/or demographic composition of the population, in the capability of the area to produce goods and services for its own consumption, and/or national economic and demographic conditions can all influence the projection of each sector's population-dependent job opportunities. The most critical operational assumptions here are the local-national per capita residentiary employment ratios. Of special importance is the ability to adjust these assumptions, to reflect structural changes, as market expansion leads to import substitution possibilities.

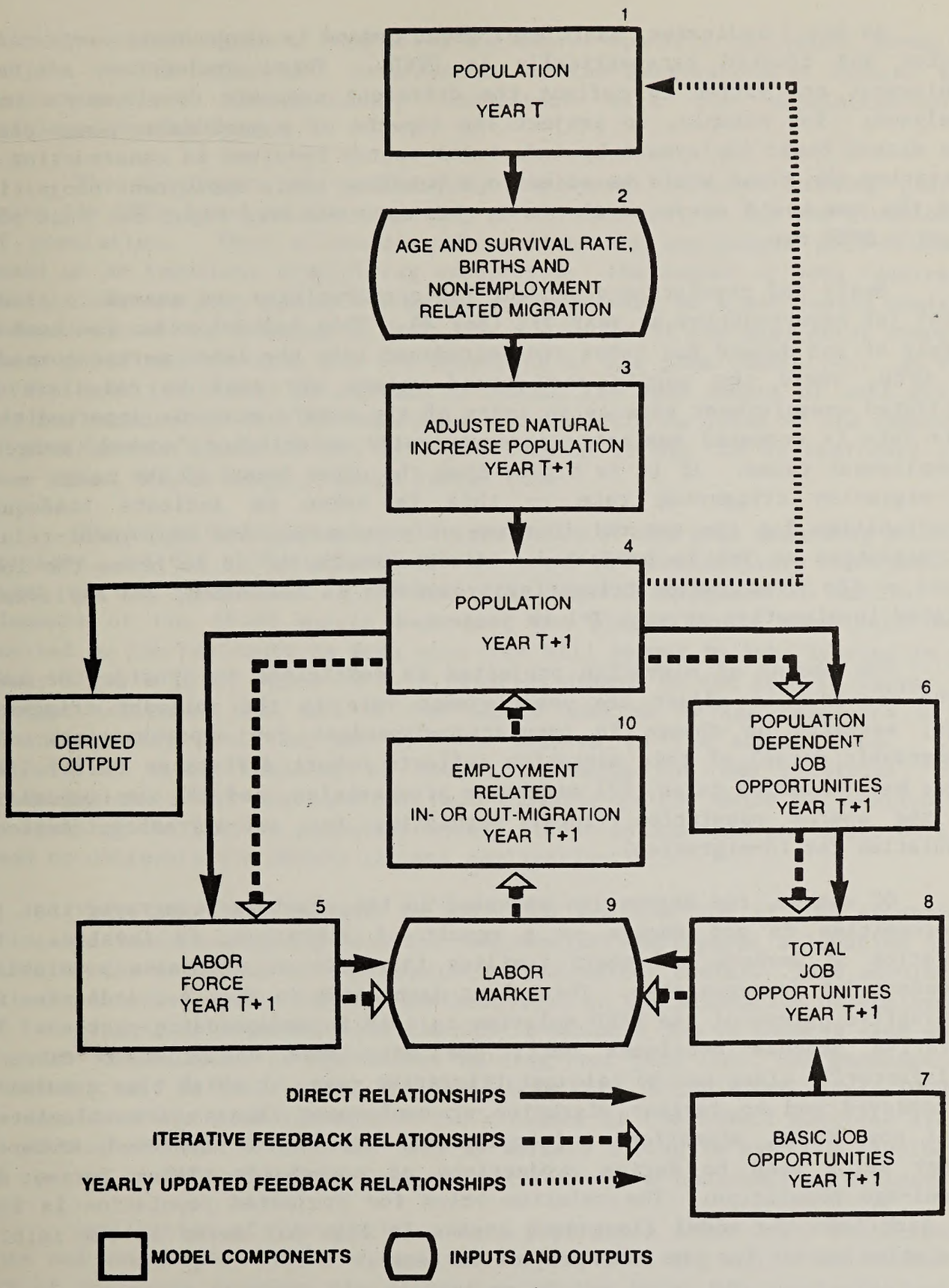

Fig. A.1 Utah Process and Demographic Impact Simulation Model General Flow Chart (Source: *Final Socioeconomic Technical Report, Uintah Basin Synfuels Development*, Utah State Energy Office et al., Feb. 1983

As Box 7 indicates, basic employment demand is exogenously projected by sector and treated parametrically in UPED. These projections of basic employment are varied to reflect the different economic developments to be analyzed. For example, to project the impacts of a particular power plant, the direct basic employment by industrial sector involved in constructing and operating the plant would be added to a baseline basic employment projections and the sum would serve as the basic job opportunities input for that power plant's UPED run.

Basic and population-dependent job opportunities are summed to produce total job opportunities at year T+1 (Box 8). This initial value for both the supply of and demand for labor are introduced into the labor market component of UPED, where the supply and demand values are used to calculate the projected unemployment rate as an index of the area's economic opportunities. This rate is compared against a parametrically established "normal" range of unemployment rates. If it is higher than the upper bound of the range -- the out-migration triggering rate -- this is taken to indicate inadequate opportunities for the natural increase of population, and employment-related out-migration at T+1 is projected. Alternatively, if it is below the lower bound -- the in-migration triggering prosperity is indicated, and employment-related in-migration at year T+1 is projected.

The amount of migration projected is sufficient to provide the labor force required to adjust the unemployment rate to the relevant triggering rate, assuming no change in population-dependent job opportunities. The demographic detail of this migration reflects cohort difference in (1) labor force participation rates, (2) migration propensities, and (3) the composition of the source population (local population for out-migration, national population for in-migration).

Of course, the assumption stressed in the previous paragraph, that job opportunities do not change as a result of migration, is invalid. The migration of workers and their families increases or decreases population-dependent job opportunities. This short-dash arrow in Fig. A.1 indicates the interactive nature of the UPED solution to this interdependence problem. The iterative process continues until the calculated unemployment rate is satisfactorily close to the relevant triggering rate, at which time a solution is achieved and no further migration or employment changes are calculated. Final population, migration, and employment outputs are presented, with the former being used to derive projections of households, labor force, and school-age population. The solution value for projected population is then fed back into the model (long-dash arrows in Fig. A.1 serve as the initial population vector for the next projection year).

A.2.2 The Spatial Allocation Model (SAM)

This model is a computerized process for distributing MCD-level UPED projections of population and employment among constituent CCDs. The SAM

allocates total regional population and sector-specific employment among CCDs subject to the employment requirements of the geographically located basic industries and simultaneously consistent with the population-serving residentiary employment.

The allocation of residentiary employment reflects trading patterns among the CCDs based on the structure of service centers and the distribution of population. This allocation of residentiary employment projections is based on an important simplifying assumption: the number of jobs required to fulfill residentiary demand for goods and services, on a per capita basis, is independent of the location of both the residences of the population demanding these goods and services and the locations of the jobs themselves. In other words, each individual is assumed to demand the same amount of each good or service produced in the CCD regardless of which CCD he lives in and regardless of whether his demand is met by a job located in his CCD of residence or in some other, higher-order, market center CCD.

The relationship between the population of one area demanding goods and services, and the allocation of CCDs of total MCD residentiary employment, is given by the elements of a "SPINT" (for SPatial INTeraction) matrix. The elements of the SPINT matrix represent the proportion of the total demand exerted by the residents in each area that will be met by jobs located in each area; e.g., a SPINT value of 0.25 relating demand in one area to supply from another indicates that 25% of the demand exerted by the residents of the demanding area would be met by jobs located in the supply area. (This calculation would include, of course, a value for own provision, r=c). Producing the SPINT matrices for each industry is the major calibration task in applying the SAM. A potential model, linear in distance and employment, is used to calibrate the SPINTs in this application.

Thus, the jobs located in each CCD are the sum of the exogenously allocated basic employment and the residentiary employment allocation determined by the structure of the population and market center. This population-allocation procedure is based, interactively, on the allocation of employment. It is recognized, however, that the CCD in which a job is located need not be the CCD of residence of the worker holding that job; i.e., the phenomenon of commuting must be dealt with. To accomplish this, a CCD x CCD matrix (COMMUT) is specified for each industry. The elements of the COMMUT matrices are the proportion of jobs in each CCD held by workers living in each CCD (including, of course, the CCD where the jobs are located -- the noncommuting workers).

Application of CCD-specific whole population labor force participation rate and unemployment rate assumptions to the resulting sum of all workers by CCD of residence produces the allocation of the total MCD population projection to the CCD level and completes the allocation procedure. The SAM outputs consist of yearly allocations of total population (age and sex detail are not maintained in SAM) and of employment by a 27-sector aggregation of the 66 UPED sectors.

A.2.3 The Energy Development Commuting Distribution Gravity Model

The gravity models used by APA Planning and Research to distribute the construction and operations work forces for the respective energy projects among the communities took the general form:

$$NL_i = \frac{A_i}{A_{Total}}$$

where

NL_i = The proportion of the work force (construction or operations) associated with a given project, residing in community i.

A_i = The attractiveness of community i.

A_{Total} = The sum of A_i over all the communities (in this case, Roosevelt/Myton/Ballard, Vernal/Ashley Valley, and Rangely).

The values for A_i are determined by the function:

$$A_i = \frac{POP_i}{D_{ij}B_j}$$

where

A_i = Attractiveness of the community.

POP_i = Population of community i (1980).

D_{ij} = Distance between community i and project j.

B_j = Commuting distance elasticity, which measures the responsiveness of workers to distance from the project site.

Studies by the authors of *Characteristics and Settlement Patterns of Energy-Related Operating Workers in the Northern Great Plains* and *Construction Worker Profile* produced a commuting distance elasticity (B_j) of 1.019 for construction workers. This elasticity for construction workers was used in this study. It was assumed, however, that, given high gasoline prices and the relatively long distances from any community to the Uintah Basin synfuels projects, the more permanent operations workers would be more sensitive to travel. Therefore, a commuting distance elasticity of 2.0 was used for operations workers.

APPENDIX B

BASELINE EMPLOYMENT AND INCOME DATA BY COUNTY

Table B.1 Historical Employment by Economic Sector and Year -- Carbon County (1970-1980)[a]

Economic Sector	Sectoral Employment, by Year											Average Annual Compound Percent Change	
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1970-1975	1975-1980
Agriculture	249	233	215	222	229	214	211	221	233	224	226	-2.98	1.10
Mining	987	1,065	1,039	1,033	1,087	1,350	1,744	1,712	1,668	2,209	2,325	6.46	11.49
Contract Construction	128	95	119	150	201	220	242	283	324	307	338	5.57	8.97
Manufacturing	187	179	211	256	283	276	254	296	301	308	281	8.10	0.36
Transportation, Communication, and Utilities	460	461	466	437	404	455	507	550	601	640	650	-0.22	7.39
Wholesale and Retail Trade	922	986	1,030	1,159	1,170	1,190	1,356	1,458	1,703	1,795	1,762	5.24	8.17
Finance, Insurance, and Real Estate	135	135	141	149	173	277	223	248	235	240	242	15.46	-2.67
Services	464	485	494	500	557	567	555	558	617	852	1,083	4.09	13.82
Government	1,388	1,414	1,411	1,336	1,367	1,408	1,438	1,534	1,842	1,890	1,828	0.29	5.36
Nonfarm Proprietors	470	480	475	474	543	508	545	547	568	609	650	1.57	5.05
Total	5,390	5,533	5,601	5,716	6,014	6,465	7,075	7,407	8,092	9,074	9,385	3.70	7.74

[a]Totals may not add due to rounding.

Source: Utah Department of Employment Security, selected annual reports (1970-1980), and U.S. Department of Commerce, Bureau of Economic Analysis, *Regional Economic Information System (REIS)*.

Table B.2 Historical Employment by Economic Sector and Year -- Emery County (1970-1980)[a]

Economic Sector	Sectoral Employment, by Year											Average Annual Compound Percent Change	
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1970-1975	1975-1980
Agriculture	452	459	451	456	462	468	456	463	465	460	464	0.70	-0.17
Mining	366	336	472	642	836	1,061	1,256	1,340	1,377	1,935	2,105	23.72	14.69
Contract Construction	b	b	431	708	420	587	1,179	1,443	1,315	916	522	c	-2.32
Manufacturing	b	b	16	b	b	b	(10-99)	24	20	25	22	c	c
Transportation, Communication, and Utilities	34	37	46	74	114	152	191	298	418	486	513	34.92	27.54
Wholesale and Retail Trade	161	180	203	242	226	245	334	348	391	353	335	8.76	6.46
Finance, Insurance, and Real Estate	b	b	3	b	b	b	(1-9)	12	22	47	65	c	c
Services	63	48	61	91	111	205	145	181	217	233	225	26.61	1.88
Government	370	362	356	329	339	350	358	434	606	655	716	-1.11	15.39
Nonfarm Proprietors	204	209	185	176	151	233	261	398	447	519	485	2.69	15.79
Total	1,825	1,748	2,224	2,773	2,695	3,326	4,214	4,941	5,279	5,629	5,452	12.75	10.39

[a]Totals may not add due to rounding.

[b]Not available.

[c]Undefined.

Source: Utah Department of Employment Security, selected annual reports (1970-1980), and U.S. Department of Commerce, Bureau of Economic Analysis, *Regional Economic Information System (REIS)*.

Table B.3 Average Monthly Nonagricultural Wages by Economic Sector and County, 1975-1980 (1980 $)

County/Sector	Average Monthly Wages, by Year					
	1975	1976	1977	1978	1979	1980
Carbon County						
Mining	1,232	1,405	1,617	1,833	1,841	1,980
Contract Construction	999	927	995	1,252	1,210	1,401
Manufacturing	618	707	676	781	836	820
Transportation, Communication, and Utilities	1,058	1,165	1,343	1,478	1,636	1,725
Wholesale and Retail Trade	478	531	566	661	721	775
Finance, Insurance, and Real Estate	740	622	646	753	773	849
Services	395	438	445	479	603	704
Government	639	682	737	721	760	855
Emery County						
Mining	1,141	1,274	1,419	1,502	1,679	1,966
Contract Construction	1,465	1,760	1,979	1,981	2,197	2,410
Manufacturing	a	a	980	856	996	882
Transportation, Communication, and Utilities	919	1,081	1,299	1,425	1,555	1,777
Wholesale and Retail Trade	349	496	562	592	516	490
Finance, Insurance, and Real Estate	a	a	366	634	805	806
Services	336	437	482	579	572	716
Government	590	627	645	833	803	842

[a]Actual data not shown to avoid disclosure of information from an individual firm.

Source: Utah Department of Employment Security, selected annual reports (1975-1980).

Table B.4 Total Personal Income by County and Year, 1970-1980 (1980 $ x 10^3)

Personal Income by Year	State of Utah	Carbon County	Emery County
1970	7,275,680	100,946	24,986
1971	7,712,398	104,868	23,423
1972	8,339,130	117,654	31,851
1973	8,804,252	127,624	40,197
1974	8,940,144	131,653	39,445
1975	9,109,633	145,475	45,207
1976	9,785,854	160,741	58,755
1977	10,383,316	172,947	68,813
1978	11,015,672	186,002	76,062
1979	11,464,559	223,936	88,855
1980	11,248,719	203,491	79,334

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Table 5 (April 1982), and the Utah Population Committee.

APPENDIX C

HOUSING DEMAND BY COUNTY AND COMMUNITY

Table C.1 Change in Housing Demand by County and Community Resulting from the Household Projections of the Proposed Action Development Scenario[a]

County/Community	Change in Housing Demand, by Type and Year (No. of Units)															Cumulative Growth Factor, 1985-2005		
	1985			1990			1995			2000			2005					
	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes
Carbon County	16	4	7	2,417	604	1,007	2853	713	1,189	3,169	792	1,320	3,641	910	1,517	228	228	217
East Carbon CCD[c]	4	1	2	691	173	288	858	215	358	962	241	401	1106	277	461	277	277	231
East Carbon	3	1	1	511	128	213	635	159	265	712	178	297	818	205	341	273	205	341
Sunnyside	1	0	1	179	45	75	223	56	93	250	63	104	287	72	120	287	d	120
Unincorporated Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Helper CCD	2	1	1	191	48	80	185	46	77	178	45	74	196	49	82	98	49	82
Helper	1	0	1	115	29	48	111	28	46	107	27	45	118	29	49	118	d	49
Scofield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Unincorporated Areas	1	0	0	76	19	32	74	19	31	71	18	30	78	20	33	78	d	d
Price CCD	10	3	4	1,535	384	640	1,810	453	754	2,028	507	845	2,339	585	975	234	195	244
Hiawatha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Price	7	2	3	998	250	416	1,177	294	490	1,318	330	549	1,520	380	634	217	190	211
Wellington	2	1	1	276	69	115	326	82	136	365	91	152	421	105	176	211	105	176
Unincorporated Areas	2	1	1	261	65	109	308	77	128	345	86	144	398	100	166	199	100	166
Emery County	2	1	1	331	83	138	321	80	134	313	78	130	346	86	144	173	86	144
Castle Dale-Huntington CCD	2	1	1	231	58	96	240	60	100	245	61	102	274	69	114	137	69	114
Castle Dale	1	0	0	82	20	34	84	21	35	86	22	36	96	24	40	96	d	d
Cleveland	0	0	0	14	4	6	14	4	6	14	4	6	17	4	7	d	d	d
Elmo	0	0	0	9	2	4	10	2	4	10	3	4	11	3	5	d	d	d
Huntington	1	0	0	58	14	24	60	15	25	61	15	26	68	17	29	68	d	d
Orangeville	1	0	0	58	14	24	60	15	25	61	15	26	68	17	29	68	d	d
Unincorporated Areas	0	0	0	11	3	5	12	3	5	12	3	5	14	4	6	d	d	d
Green River CCD	1	0	0	100	25	42	81	20	34	68	17	28	71	18	30	71	d	d
Green River	1	0	0	86	22	36	70	17	29	58	15	24	61	15	26	61	d	d
Unincorporated Areas	0	0	0	14	4	6	11	3	5	10	2	4	10	3	4	d	d	d

[a]It is assumed that each household requires a housing unit, thereby resulting in a one-to-one correspondence between household projections generated by UPED and housing demand.

[b]Totals may not add due to rounding.

[c]Census County Division (CCD).

[d]Undefined.

Table C.2 Change in Housing Demand by County and Community Resulting from the Household Projections of the Partial Conversion Development Scenario[a]

County/Community	Change in Housing Demand, by Type and Year (No. of Units)															Cumulative Growth Factor, 1985-2005		
	1985			1990			1995			2000			2005					
	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes
Carbon County	13	4	6	752	188	314	1,644	411	685	2,314	579	964	2,761	691	1,151	135	173	192
East Carbon CCD[c]	4	1	2	215	54	90	494	124	206	698	175	291	834	209	348	209	173	174
East Carbon	3	1	1	159	40	67	366	92	153	517	130	216	618	155	258	206	155	258
Sunnyside	2	1	1	56	14	24	129	33	54	182	46	76	217	55	145	109	55	145
Unincorporated Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Helper CCD	2	1	1	60	15	25	99	25	41	130	33	54	149	38	62	75	38	62
Helper	2	1	1	36	9	15	59	15	25	78	20	33	89	23	37	45	23	37
Scofield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Unincorporated Areas	1	1	1	24	6	10	39	10	17	53	14	22	60	15	25	60	15	25
Price CCD	9	3	4	478	120	199	1,053	264	439	1,486	372	619	1,779	445	741	198	148	185
Hiawatha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Price	6	2	3	311	78	130	684	171	285	966	242	403	1,157	290	482	193	145	161
Wellington	2	1	1	86	22	36	190	48	79	268	67	179	320	80	134	160	80	134
Unincorporated Areas	2	1	1	81	21	34	179	45	75	253	64	106	303	76	126	152	76	126
Emery County	2	1	1	104	26	43	171	43	73	237	60	99	270	68	113	135	68	113
Castle Dale-Huntington CCD	2	1	1	72	18	30	132	33	55	180	45	75	207	52	86	104	52	86
Castle Dale	1	1	1	26	7	11	46	12	19	63	16	26	73	19	31	73	19	31
Cleveland	0	0	0	5	2	2	8	2	4	11	3	5	12	3	5	d	d	d
Elmo	0	0	0	3	1	2	6	2	3	8	2	3	9	3	4	d	d	d
Huntington	1	1	1	18	5	8	33	9	14	45	12	19	52	13	22	52	13	22
Orangeville	1	1	1	18	5	8	33	9	14	45	12	19	52	13	22	52	13	22
Unincorporated Areas	0	0	0	4	1	2	7	2	3	9	3	4	11	3	5	d	d	d
Green River CCD	1	1	1	31	8	13	36	9	15	49	13	21	52	13	22	52	13	22
Green River	1	1	1	27	7	11	32	8	13	42	11	18	45	12	19	45	12	19
Unincorporated Areas	0	0	0	5	2	2	5	2	2	7	2	3	8	2	3	d	d	d

[a]It is assumed that each household requires a housing unit, thereby resulting in a one-to-one correspondence between household projections generated by UPED and housing demand.

[b]Totals may not add due to rounding.

[c]Census County Division (CCD).

[d]Undefined.

Table C.3 Change in Housing Demand by County and Community Resulting from the Household Projections of the Unitized Development Scenario[a]

County/Community	Change in Housing Demand, by Type and Year (No. of Units)															Cumulative Growth Factor, 1985-2005		
	1985			1990			1995			2000			2005					
	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes
Carbon County	6	2	3	10	3	4	716	179	298	1,357	340	566	1,825	457	761	304	229	254
East Carbon CCD[c]	2	1	1	2	1	1	208	52	87	406	102	169	548	137	229	274	137	229
East Carbon	2	1	1	2	1	1	154	39	64	300	75	125	406	102	169	203	102	169
Sunnyside	1	1	1	1	1	1	54	14	23	106	27	44	143	36	60	143	36	60
Unincorporated Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Helper CCD	1	1	1	1	1	1	49	13	21	80	20	33	98	25	41	98	25	41
Helper	1	1	1	1	1	1	30	8	13	48	12	20	59	15	25	59	15	25
Scofield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Unincorporated Areas	0	0	0	0	0	0	20	5	8	32	8	14	39	10	17	d	d	d
Price CCD	4	1	2	8	2	3	460	115	192	872	218	364	1,180	295	492	295	295	246
Hiawatha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Price	3	1	1	5	2	2	299	75	125	567	142	236	767	192	320	256	192	320
Wellington	1	1	1	2	1	1	83	21	35	158	40	66	213	54	89	213	54	89
Unincorporated Areas	1	1	1	2	1	1	78	20	33	149	38	62	201	51	84	201	51	84
Emery County	1	1	1	1	1	1	86	22	36	139	35	58	179	45	75	179	45	79
Castle Dale-Huntington CCD	0	0	0	0	0	0	62	16	26	108	27	45	137	35	57	d	d	d
Castle Dale	0	0	0	0	0	0	22	6	9	38	10	16	48	12	20	d	d	d
Cleveland	0	0	0	0	0	0	4	1	2	7	2	3	9	3	4	d	d	d
Elmo	0	0	0	0	0	0	3	1	1	5	2	2	6	2	3	d	d	d
Huntington	0	0	0	0	0	0	16	4	7	27	7	12	35	9	15	d	d	d
Orangeville	0	0	0	0	0	0	16	4	7	27	7	12	35	9	15	d	d	d
Unincorporated Areas	0	0	0	0	0	0	3	1	2	6	2	3	7	2	3	d	d	d
Green River CCD	0	0	0	0	0	0	23	6	10	33	9	14	38	10	16	d	d	d
Green River	0	0	0	0	0	0	20	5	8	28	7	12	32	8	14	d	d	d
Unincorporated Areas	0	0	0	0	0	0	3	1	2	5	2	2	6	2	3	d	d	d

[a]It is assumed that each household requires a housing unit, thereby resulting in a one-to-one correspondence between household projections generated by UPED and housing demand.

[b]Totals may not add due to rounding.

[c]Census County Division (CCD).

[d]Undefined.

Table C.4 Change in Housing Demand by County and Community Resulting from the Household Projections of the Maximum Development Scenario[a]

County/Community	Change in Housing Demand, by Type and Year (No. of Units)															Cumulative Growth Factor, 1985-2005		
	1985			1990			1995			2000			2005					
	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes
Carbon County	1,177	294	490	2,603	651	1,085	3,351	838	1,396	3,629	907	1,512	3,510	878	1,463	2.98	2.99	2.99
East Carbon CCD[c]	143	36	60	317	79	132	368	92	154	378	95	158	371	93	155	2.59	2.58	2.58
East Carbon	106	27	44	235	59	98	273	68	114	280	70	117	274	69	114	2.58	2.56	2.59
Sunnyside	37	9	16	83	21	35	96	24	40	98	25	41	97	24	40	2.62	2.67	2.50
Unincorporated Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Helper CCD	81	20	34	185	46	77	285	71	119	344	86	144	338	85	141	4.17	4.25	4.15
Helper	49	12	20	110	28	46	171	43	71	206	52	86	203	51	85	4.14	4.25	4.25
Scofield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Unincorporated Areas	32	8	14	74	18	31	114	29	48	137	34	57	135	34	56	4.22	4.25	4.00
Price CCD	952	238	397	2,101	525	876	2,697	674	1,124	2,907	727	1,211	2,801	700	1,167	2.94	2.94	2.94
Price	619	155	258	1,366	342	569	1,753	438	731	1,889	472	787	1,820	455	759	2.94	2.94	2.94
Wellington	172	43	72	378	95	158	485	121	202	523	131	218	505	126	210	2.94	2.93	2.92
Hiawatha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Unincorporated Areas	162	41	68	357	89	149	458	115	191	494	124	206	476	119	198	2.94	2.90	2.91
Emery County	138	35	58	158	39	66	196	49	82	208	52	87	201	50	84	1.46	1.43	1.45
Castle Dale-Huntington CCD	111	28	46	124	31	52	158	39	66	167	42	70	161	40	67	1.45	1.43	1.46
Castle Dale	38	10	16	43	11	18	55	14	23	58	15	24	56	14	23	1.47	1.40	1.44
Cleveland	7	2	3	7	2	3	10	2	4	10	3	4	10	3	4	1.43	1.50	1.33
Elmo	4	1	2	5	1	2	7	2	3	7	2	3	7	2	3	1.75	2.00	1.50
Huntington	28	7	12	31	8	13	40	10	17	42	11	18	40	10	17	1.43	1.43	1.42
Orangeville	28	7	12	31	8	13	40	10	17	42	11	18	40	10	17	1.43	1.43	1.42
Unincorporated Areas	5	1	2	7	2	3	8	2	3	8	2	4	8	2	3	1.60	2.00	1.50
Green River CCD	18	5	8	16	4	7	18	5	8	19	5	8	18	5	8	1.00	1.00	1.00
Green River	16	4	7	14	3	6	16	4	7	16	4	7	16	4	7	1.00	1.00	1.00
Unincorporated Areas	2	1	1	2	0	1	2	1	1	3	1	1	2	1	1	1.00	1.00	1.00
Emery-Ferron CCD	9	2	4	17	4	7	22	5	9	22	6	9	22	6	9	2.44	3.00	2.25
Clawson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Emery	2	1	1	4	1	2	5	1	2	5	1	2	5	1	2	2.50	1.00	2.00
Ferron	7	2	3	13	3	5	16	4	7	17	4	7	17	4	7	2.43	2.00	2.33
Unincorporated Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d

[a]It is assumed that each household requires a housing unit, thereby resulting in a one-to-one correspondence between household projections generated by UPED and housing demand.

[b]Totals may not add due to rounding.

[c]Census County Division (CCD).

[d]Undefined.

Table C.5 Change in Housing Demand by County and Community Resulting from the Household Projections of the Limited Development Scenario[a]

County/Community	Change in Housing Demand, by Type and Year (No. of Units)														Cumulative Growth Factor, 1985-2005		
	1985			1990			1995			2000			2005					
	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes	Single Family	Multi-family	Mobile Homes
Carbon County	836	209	349	2,339	585	975	3,014	753	1,256	3,286	821	1,369	3,182	795	1,326	3.81	3.80	3.80
East Carbon CCD	51	13	21	233	58	97	266	66	111	274	69	114	270	68	113	5.29	5.23	5.38
East Carbon	38	9	16	172	43	72	197	49	82	203	51	85	200	50	83	5.26	5.56	5.19
Sunnyside	13	3	6	61	15	25	69	17	29	71	18	30	70	18	29	5.38	6.00	4.83
Unincorporated Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Helper CCD	52	13	22	169	42	71	267	67	111	326	81	136	320	80	134	6.15	6.15	6.09
Helper	31	8	13	101	25	42	160	40	67	196	49	82	193	48	80	6.23	6.00	6.15
Scofield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Unincorporated Areas	20	5	9	68	17	28	107	27	45	130	33	54	128	32	53	6.40	6.40	5.89
Price CCD	734	183	306	1,937	484	807	2,481	620	1,034	2,686	671	1,119	2,591	648	1,080	3.53	3.54	3.53
Price	477	119	199	1,259	315	525	1,613	403	672	1,745	436	727	1,684	421	702	3.53	3.54	3.53
Wellington	132	33	55	349	87	145	446	112	186	484	121	202	467	117	195	3.54	3.55	3.55
Hiawatha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Unincorporated Areas	125	31	52	329	82	137	422	105	176	457	114	190	440	110	184	3.52	3.55	3.54
Emery County	86	21	36	131	33	55	163	41	68	175	44	73	169	42	71	1.97	2.00	1.97
Castle Dale-Huntington CCD	76	19	32	104	26	43	131	33	55	141	35	59	136	34	57	1.79	1.79	1.78
Castle Dale	26	7	11	37	9	15	46	11	19	49	12	21	47	12	20	1.81	1.71	1.82
Cleveland	5	1	2	6	2	3	8	2	3	8	2	4	8	2	4	1.60	2.00	2.00
Elmo	3	1	1	4	1	2	5	1	2	5	1	2	5	1	2	1.67	1.00	2.00
Huntington	19	5	8	26	6	11	33	8	14	35	9	15	34	9	14	1.79	1.80	1.75
Orangeville	19	5	8	26	6	11	33	8	14	35	9	15	34	9	14	1.79	1.80	1.75
Unincorporated Areas	4	1	2	5	1	2	7	2	3	7	2	3	7	2	3	1.75	2.00	1.50
Green River CCD	1	0	1	10	3	4	12	3	5	12	3	5	12	3	5	12.00	d	5.00
Green River	1	0	1	9	2	4	10	3	4	10	3	4	10	3	4	10.00	d	4.00
Unincorporated Areas	0	0	0	1	0	1	2	0	1	2	0	1	2	0	1	d	d	d
Emery-Ferron CCD	9	2	4	17	4	7	21	5	9	22	5	9	22	5	9	2.44	2.50	2.25
Clawson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d
Emery	2	1	1	4	1	2	5	1	2	5	1	2	5	1	2	2.50	1.00	2.00
Ferron	7	2	3	13	3	5	16	4	7	16	4	7	16	4	7	2.29	2.00	2.33
Unincorporated Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d

[a]It is assumed that each household requires a housing unit, thereby resulting in a one-to-one correspondence between household projections generated by UPED and housing demand.

[b]Totals may not add due to rounding.

[c]Census County Division (CCD).

[d]Undefined.

APPENDIX D

FISCAL PROFILES OF COUNTIES AND COMMUNITIES

Table D.1 Fiscal Profile of Carbon County and Select Communities of Interest

Budget Category	Carbon County		East Carbon City		Helper	
	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]
Revenue Base						
Assessed valuation ($ x 10^6)	-	115.900	-	3.540	-	6.860
Mill levy	-	16.00	-	18.18	-	8.00
Revenues (10^6)						
Property taxes	1.748	2.260	0.048	0.060	0.060	0.058
Sales taxes	0.286	0.300	0.051	0.055	0.189	0.200
Federal transfers	0.586	1.217	0.017	0.014	0.024	0.033
State transfers	0.333	0.235	0.015	0.021	0.025	0.024
Service charges	0.505	0.543	0.127	0.129	1.166	1.285
Interest	0.249	0.160	-	-	-	-
Royalties	-	-	-	-	-	-
Private contributions	-	-	-	-	-	-
Miscellaneous	0.571	0.477	0.020	0.117	0.367	0.305
Total Revenues	4.278	5.192	0.278	0.396	1.831	1.905
Expenditures (10^6)						
Law enforcement	0.596	0.755	0.145	0.144	0.123	0.145
Fire protection	0.007	0.100	0.009	0.015	0.067	0.026
Public health	0.362	0.438	-	-	0.004	0.015
Roads/streets	0.796	1.070	0.024	0.040	0.118	0.123
Recreation	0.099	0.165	0.003	0.004	0.033	0.053
Agriculture	0.180	0.211	-	-	-	-
General administration	2.280	2.441	0.043	0.046	-	-
Planning	-	-	-	-	-	-
Bond retirement	-	-	0.024	0.024	0.048	0.048
Utilities	-	-	0.166	0.182	1.118	1.285
Total Expenditures	4.320	5.180	0.414	0.455	1.511	1.695

Table D.1 (Cont'd)

Budget Category	Price		Sunnyside		Wellington	
	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]
Revenue Base						
Assessed valuation ($ x 10^6)	-	28.668	-	0.979	-	3.137
Mill levy	-	14.35	-	6.00	-	11.16
Revenues (10^6)						
Property taxes	0.356	0.390	0.006	0.006	0.019	0.030
Sales taxes	0.854	1.160	0.026	0.025	0.033	0.050
Federal transfers	0.222	0.228	0.005	0.005	0.015	0.019
State transfers	0.085	0.103	0.004	0.003	0.007	0.016
Service charges	4.144	4.925	0.034	0.034	0.209	0.297
Interest	-	-	-	-	-	-
Royalties	-	-	-	-	-	-
Private contributions	-	-	-	-	-	-
Miscellaneous	0.912	1.142	0.125	0.165	0.045	0.053
Total Revenues	6.573	7.948	0.200	0.238	0.328	0.465
Expenditures (10^6)						
Law enforcement	0.456	0.649	0.032	0.038	0.022	0.025
Fire protection	0.127	0.129	0.002	0.003	0.004	0.003
Public health	-	-	-	-	-	-
Roads/streets	0.632	0.751	0.009	0.013	0.009	0.012
Recreation	0.323	0.473	0.022	0.027	0.003	0.004
Agriculture	-	-	-	-	-	-
General administration	0.873	0.971	0.106	0.141	0.124	0.122
Planning	0.020	0.010	-	-	-	-
Bond retirement	-	0.046	-	-	-	-
Utilities	3.945	4.990	0.022	0.046	0.183	0.296
Total Expenditures	6.376	8.019	0.193	0.268	0.345	0.462

[a]Average annual revenues and expenditures are presented for calendar years 1980 through 1982 for the counties, and for fiscal years 1981 and 1982 for the communities.

[b]Current annual revenues and expenditures are presented for calendar year 1983 for the counties, and for fiscal year 1983 for the communities.

Source: Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

Table D.2 Fiscal Profile of Emery County and Select Communities of Interest

Budget Category	Emery County		Castle Dale City		Cleveland	
	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]
Revenue Base						
Assessed valuation ($ x 10^6)	-	233.820	-	3.893	-	0.844
Mill levy	-	16.20	-	14.00	-	11.00
Revenues (10^6)						
Property taxes	3.241	3.265	0.066	0.051	-	0.010
Sales taxes	0.098	0.095	0.102	0.100	-	0.013
Federal transfers	0.595	0.492	0.019	0.010	-	0.002
State transfers	0.419	0.505	0.014	0.012	-	0.004
Service charges	0.054	0.049	0.158	0.059	-	0.012
Interest	0.389	0.200	-	-	-	-
Royalties	-	-	-	-	-	-
Private contributions	-	-	-	-	-	-
Miscellaneous	1.202	1.847	0.095	0.126	-	0.033
Total Revenues	5.998	6.453	0.454	0.358	-	0.074
Expenditures (10^6)						
Law enforcement	1.256	0.182	0.017	0.018	-	0.001
Fire protection	0.132	0.125	0.011	0.040	-	0.004
Public health	0.243	0.214	-	-	-	-
Roads/streets	1.818	2.507	0.017	0.056	-	0.016
Recreation	0.135	0.100	0.077	0.075	-	0.011
Agriculture	0.108	0.107	-	-	-	-
General administration	1.830	2.932	0.092	0.099	-	0.043
Planning	-	-	0.003	0.003	-	-
Bond retirement	0.277	0.285	0.006	0.005	-	-
Utilities	-	-	0.195	0.138	-	-
Total Expenditures	5.799	6.452	0.418	0.434	-	0.075

Table D.2 (Cont'd)

Budget Category	Elmo		Emery		Ferron	
	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]
Revenue Base						
Assessed valuation ($ x 10^6)	-	0.591	-	0.601	-	3.377
Mill levy	-	11.00	-	17.65	-	18.65
Revenues (10^6)						
Property taxes	-	0.005	-	0.010	0.049	0.057
Sales taxes	-	0.019	-	0.010	0.053	0.058
Federal transfers	-	0.001	-	0.002	0.009	0.008
State transfers	-	0.002	-	0.003	0.019	0.009
Service charges	-	0.019	-	0.036	0.137	0.160
Interest	-	-	-	-	-	-
Royalties	-	-	-	-	-	-
Private contributions	-	-	-	-	-	-
Miscellaneous	-	0.004	-	0.020	0.080	0.060
Total Revenues	-	0.050	-	0.081	0.347	0.352
Expenditures (10^6)						
Law enforcement	-	c	-	-	-	-
Fire protection	-	0.001	-	0.001	0.025	0.033
Public health	-	-	-	-	-	-
Roads/streets	-	0.001	-	-	0.067	0.038
Recreation	-	0.002	-	0.001	0.018	0.026
Agriculture	-	-	-	-	-	-
General administration	-	0.006	-	0.043	0.046	0.063
Planning	-	-	-	-	0.010	0.012
Bond retirement	-	-	-	-	-	-
Utilities	-	0.019	-	0.015	0.148	0.181
Total Expenditures	-	0.029	-	0.060	0.314	0.353

Table D.2 (Cont'd)

Budget Category	Green River		Huntington		Orangeville	
	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]	Average Annual[a]	Current Annual[b]
Revenue Base						
Assessed valuation ($ x 10^6)	-	2.287	-	5.091	-	2.704
Mill levy	-	21.00	-	14.25	-	21.63
Revenues						
Property taxes	0.062	0.065	-	0.066	0.044	0.052
Sales taxes	0.129	0.132	-	0.118	0.044	0.050
Federal transfers	0.005	0.006	-	0.014	0.006	0.009
State transfers	0.007	0.008	-	0.013	0.012	0.008
Service charges	c	-	-	0.225	0.076	0.075
Interest	-	-	-	-	-	-
Royalties	-	-	-	-	-	-
Private contributions	-	-	-	-	-	-
Miscellaneous	0.053	0.064	-	0.141	0.061	0.042
Total Revenues	0.256	0.275	-	0.577	0.243	0.236
Expenditures						
Law enforcement	0.028	0.042	-	0.038	-	0.015
Fire protection	0.014	0.013	-	0.018	0.019	0.013
Public health	-	-	-	-	-	-
Roads/streets	0.046	0.119	-	0.046	0.042	0.023
Recreation	0.014	0.029	-	0.028	0.024	0.010
Agriculture	-	-	-	-	-	-
General administration	0.024	0.088	-	0.245	-	-
Planning	-	0.002	-	0.012	0.008	0.023
Bond retirement	-	0.029	-	-	-	-
Utilities	-	-	-	0.201	0.075	0.074
Total Expenditures	0.126	0.322	-	0.588	0.168	0.158

[a]Average annual revenues and expenditures are presented for calendar years 1980 through 1982 for the counties, and for fiscal years 1981 and 1982 for the communities.

[b]Current annual revenues and expenditures are presented for calendar year 1983 for the counties, and for fiscal year 1983 for the communities.

[c]Less than $1,000 per annum.

Source: Nellis, Lee, and John K. Nicholson, Utah State University Foundation, unpublished information (June 1983).

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